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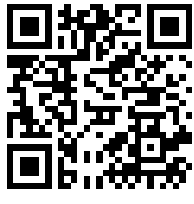

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THE CHINA SEA DIRECTORY, VOL. I.

FOURTH EDITION, 1896.

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(To be pasted on inside of cover of all Sailing Directions.)

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[In Chart Depots the two first columns are alone to be filled up.]

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THE

CHINA SEA DIRECTORY,

VOL. I.

CONTAINING

DIRECTIONS FOR THE APPROACHES TO THE CHINA SEA, BY MALACCA, SINGAPORE, SUNDA, BANKA, GASPAR, CARIMATA, RHIO, BERHALA, AND DURIAN STRAITS.

FOURTH EDITION.

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

LONDON:
PRINTED FOR THE HYDROGRAPHIC OFFICE, ADMIRALTY,
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AND SOLD BY
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1896.

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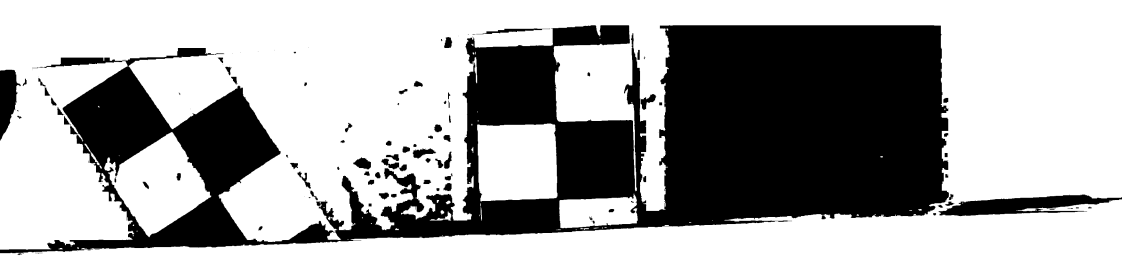

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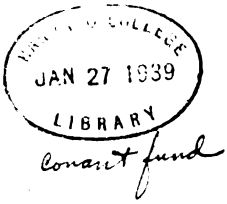

ADVERTISEMENT TO FOURTH EDITION.

The China Sea Directory consists of four volumes; Volume I. treats of the islands and straits in the south-western approach to the China sea, as below mentioned; Volume II. of the China sea and adjacent coasts as far northward as Hong Kong and Luzon; Volume III. of the coast of China; and Volume IV. of the Korea, Russian Tartary, and Japan.

The China Sea Directory, Vol. I., contains Sailing Directions for the approaches to the China sea by Malacca, Singapore, Sunda, Banka, Gaspar, Carimata, Rhio, Berhala, and Durian straits; also general observations on the passages from and to the Cape of Good Hope, India, &c., to Malacca and Sunda straits, and to Singapore.

The material used is from the following sources:—Malacca strait from the surveys of Lieutenants Ward and Jackson, Indian Navy, 1852–60; the whole re-triangulated in 1894 by Commander A. M. Field, H.M. surveying vessel *Egeria*. Portions of it, viz., the Lankawi islands, Penang and its approaches, Dinding island and channel, Perak river entrance and its approaches, and Larut river, have been re-surveyed by Captain Napier, Commander the Honourable F. Vereker, and Lieutenant H. Belam, in H.M. surveying vessels, 1876–84.

The whole of the western shore, from Acheh head nearly to the Karimon islands, the north and east coasts of Sumatra, is from recent surveys by the Netherlands Government.

Singapore, Banka, and Rhio straits are from the surveys of Messrs. Richards, Stanton, and Reed, Masters R.N., 1860–68, and Mr. Thompson, Government Surveyor, 1843–49; portions of Banka and Rhio strait have been re-surveyed by the Netherlands Government.

Durian strait is from the surveys of Lieutenants Collinson and Moresby, Indian Navy, 1822; Lieutenant Tjassens, Dutch Navy, 1843, with additions by Mr. Stanton, 1862.

The west coast of Sumatra, from Acheh head to Tanjong Raja (cape Felix), is from recent surveys and amendments by the Netherlands

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Government Surveying Officers; southward of that cape the information is chiefly from Messrs. Endicott and Gillis, 1833–34, and from Horsburgh; isolated spots have been recently surveyed by the Netherlands Government. But little is known of this large extent of coast.

Sunda strait to Banka strait is chiefly from recent surveys by the Dutch.

Gaspar and Carimata straits are principally from the re-surveys made by the Dutch from 1880–85; the southern approaches to Carimata were partially examined by H.M.'s surveying vessels *Sylvia* and *Nassau*, 1874–76, and the Carimata islands, with some of the Montaren group, were surveyed by Lieutenant H. Hoskyn, H.M.S. *Flying Fish*, in 1880. The positions of some of the outlying reefs, however, have yet to be investigated.

This volume was compiled in 1867; a second edition was published in 1878; and a third edition in 1886.

The present edition is by Staff-Captain C. H. C. Langdon, R.N., of the Hydrographic Department.

Information for this work has also been gathered from Notices published by Colonial authorities, by the Netherlands India Government, and from the Remark books of H.M. vessels employed on the China station.

As this volume embraces a large extent of coast, and many islands and dangers which are but imperfectly explored, it must be considered incomplete. Seamen, therefore, are invited to transmit to the Secretary of the Admiralty notice of any errors or omissions they may discover, or additional information they may obtain, with a view to the improvement of this work for the benefit of the mariner.

By the publication of this volume all Supplements, Hydrographic Notices, and Notices to Mariners, inclusive of No. 153 of 1896, embraced by it, are cancelled.

W. J. L. W.

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GLOSSARY OF A FEW USEFUL TERMS IN THE MALAY, ACHINESE, AND SIAMESE LANGUAGES.

Malay.	English.	Malay.	English.
Ayer	Fresh water.	Laut, Laut besar	Sea.
—— masin	Salt water.	Layar	Sail.
Bagan	Fishing village.	Lumpur	Mud.
Batu	Rock, stone.	Malan, or Malang	A rock a little above high water.
Benting	Fort.	Merah	Red.
Beri-beri	A disease, *see* p. 14.	Nangka	Jack fruit.
Besar	Large, great.	Padang	Plain, open space.
Beting	Sandbank.	Panjang	Long, tall.
Bukit	Hill.	Pinang	Betel nut.
Burong	Bird.	Pisang	Banana.
Chemara, Tjemara	Casuarina tree.	Ponchak	Peak of a hill.
Dapur	Cooking place.	Proa	Native boat.
Gadong	House.	Pulo, pulau	Island.
Gambier	The juice of a native plant.	Putih	White.
		Rantau	Reach of a river.
G'e	Hill, mountain.	Salat	Strait, channel.
Goh, or Koh	Island.	Sampan	Native boat.
Gunong	Mountain.	Sawa	Dry rice field.
—— api	Volcano.	Seros	Fishing enclosures.
Gusong	Shoal.	Sungi	River, stream.
Itam	Black.	Tanah	Land, country, earth.
Jalur	Native boat.	Tanjong	Cape, point.
Jermals	Fishing enclosures.	Tasik	Lake.
Kampong	Enclosure, village.	Telok	Bay, cove, creek.
Kapal	Ship.	Timbaga, tembaga	Copper.
Karang	Coral reef, rock.	Trepang	Beche de mer (edible sea slug).
Kedei	Town, large village.	Trumbu	A sunken rock.
Kelapa	Cocoa-nut.	Trusan	Channel, passage.
Kechil	Small.	Ujong	Cape, point, promontory.
Krung	River.		
Kwala, Kuala	Mouth of a river.		
Labuan	Anchorage, harbour.		
Lampong	Buoy.		

PRINCIPAL POINTS OF THE COMPASS (MALAY).

Utara	North.	Salatan	South.
Utara-samata-timor.	N.N.E.	Salatan-daya	S.S.W.
Timor-laut	N.E.	Barat-daya	S.W.
Timor-samata-utara.	E.N.E.	Barat-samata-salatan.	W.S.W.
Timor	East.	Barat-tapat	West.
Timor-tanggara	E.S.E.	Barat-samata-atara.	W.N.W.
Tanggara	S.E.	Barat-laut	N.W.
Salatan-tanggara	S.S.E.	Utara-barat-laut	N.N.W.

SYSTEM OF ORTHOGRAPHY.

Adopted by the Admiralty for Sailing Directions and Charts.

As far as has been found possible with existing knowledge, native names are spelt in accordance with the following system, which has been adopted by the principal authorities in Great Britain and by the United States, and has been for some years in process of gradual introduction into all Admiralty Sailing Directions and Charts.

1. Where native names have been so long written in a form, which, though not in accordance with this system, has become familiar to English eyes from being so spelt in all charts and maps, they are retained, and all European names are retained as spelt originally.

2. The true sound of the word, as locally pronounced, is taken as the basis of the spelling.

3. An approximation of the sound is alone aimed at. A system, which would attempt to represent the more delicate inflections of sound and accent, would be so complicated as only to defeat itself.

4. The broad features of the system adopted are that vowels are pronounced as in Italian and consonants as in English; *every letter being pronounced.* One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

5. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai*, *au*, *ei*.

The amplification of the rules is given on the following pages.

Information is invited as to the proper spelling of native names, so as to produce the nearest approximation to the true sound, by this system.

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Letters.	Pronunciation and Remarks.	Examples.
a	*ah*, *a* as in *father* - - - -	Java, Banána, Somáli, Bari.
e	*eh*, *e* as in *benefit*; *a* as in *fate* - -	Tel-el-Kebír, Oléleh, Yezo, Levúka, Peru.
i	English *e*; *i* as in *ravine*; the sound of *ee* in *beet*. Thus, not *Feejee*, but	Fiji, Hindi.
o	*o* as in *mote* - - - - -	Tokyo.
u	long *u* as in *flute*; the sound of *oo* in *boot*. *oo* or *ou* should never be employed for this sound. Thus, not *Zooloo* or *Zoulou*, but	Zulu, Sumatra.
	All vowels are shortened in sound by doubling the following consonant.	Yarra, Tanna, Mecca, Jidda, Bonny.*
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulúa.
ai	English *i* as in *ice* - - - -	Shanghai.
au	*ow* as in *how*. Thus, not *Foochow*, but	Fuchau.
ao	is slightly different from *au* - - -	Macao.
ei	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from *ey* in the English *they*, or *ei* in *eight*.	Beirút, Beilul.
b	English *b*.	
c	is always soft, but is so nearly the sound of *s* that it should be seldom used.	Celébes.
	If *Celébes* were not already recognised it would be written *Selébes*.	
ch	is always soft as in *church* - - -	Chingchin.
d	English *d*.	
f	English *f*. *Ph* should not be used for the sound of *f*. Thus, not *Haiphong*, but	Haifong, Nafa.
g	is always hard. (Soft *g* is given by *j*) -	Galápagos.
h	is always pronounced when used.	
hw	As in *what*, better rendered by *hw* than *wh*, or *h* followed by a vowel. Thus, *Hwang ho*, not *Whang ho* or *Hoang ho*.	Hwang ho, Ngan hwi.
j	English *j*. *Dj* should never be put for this sound.	Japan, Jinchueu.
k	English *k*. It should always be put for the hard *c*. Thus, not *Corea*, but	Korea.
kh	The Oriental guttural - - -	Khan.
gh	is another guttural, as in the Turkish -	Dagh, Ghazi.
l m n	As in English.	

* The *y* is retained as a terminal in this word under rule 1. The word is given as a

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Letters.	Pronunciation and Remarks.	Examples
ng	has two separate sounds, the one hard as in the English word *finger*, the other as in *singer*. As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in *loophole* - - - - -	Mokpho, Chemulpho.
th	Stands both for its sound in *thing*, and as in *this*. The former is most common.	Bethlehem.
q	should never be employed; the sound of *qu* in *quiver* is given as *kw*. When *qu* has the sound of *k*, as in *quoit*, it should be given by *k*.	Kwangtung.
r	As in English.	
s	As in *sin*.	
sh		
t		
v	As in English.	
w	- - - - - - -	Sawákin.
x		
y	is always a consonant, as in *yard*, and therefore should never be used as a terminal, *i* or *e* being substituted.	
	Thus, not *Mikindány* or *Wady*, but not *Kwaly*, but	Mikindáni, Wadi Kwale.
z	English *z* - - - - - -	Zulu.
zh	French *j*, or as *s* in *treasure* - - -	Muzhdaha.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress which affects the sound of the word, it should be marked by an *acute* accent.	Tongatábu, Galápagos, Paláwan, Saráwak.

In the case of native names in countries under the dominion of other European powers, in whose maps, charts, &c. the spelling is given according to the system adopted by that power, such orthography is, as a rule, disregarded, and the names are spelt according to the British system. Thus the island east of Java in possession of the Dutch is spelt Madoera by them, but on Admiralty charts Madura. A town in Java appears on Dutch charts as Tjilatjap; in the British, Chilachap.

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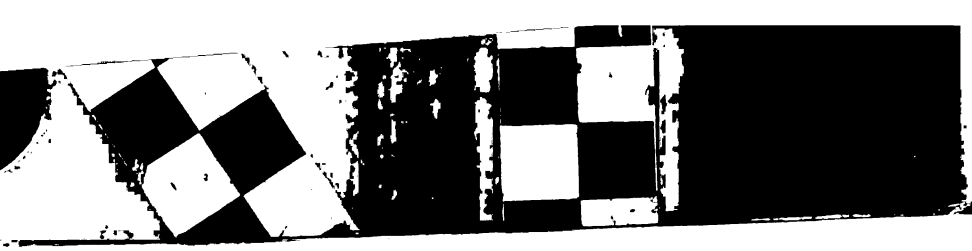

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INFORMATION RELATING TO CHARTS, SAILING DIRECTIONS, AND THE GENERAL NAVIGATION OF H.M. SHIPS.

ON THE CORRECTION OF CHARTS, LIGHT LISTS, AND SAILING DIRECTIONS.

There are three descriptions of publications as guides to navigation —the charts, the sailing directions, and the light lists—which are all affected by the continual changes and alterations that take place.

Of these the charts should always be, so far as our knowledge permits, absolutely correct to date; and the light lists should be noted for the recent alterations, though space will not permit of full details being always inserted; the sailing directions, however, cannot, from their nature, be so corrected, and *in all cases where they differ from charts, the charts must be taken as the guide.*

1. *Charts.*—When issued to a ship on commissioning, the charts have received all necessary corrections to date. As sent from the Hydrographic Office they are, as a rule, fresh from the plates. They then receive such corrections by hand in the depôts as are required, and are so issued to the ships.

All small but important corrections that can be made by hand are notified by Notices to Mariners, and should at once be placed on the charts to which they refer.

Large corrections that cannot be conveniently thus made are put upon the plates, and fresh copies are issued to the ships to replace the others, which are directed to be destroyed to prevent the possibility of their being used in the navigation of the ship.

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The dates on which these large corrections are made are noted on the chart plates in the middle of the lower edge; those of the smaller corrections at the left-hand lower corners.

In all cases of quotations of charts, these dates of corrections should be given, as well as the number of the chart (which will be found in the lower right-hand corner), in order that at the Admiralty it may be known what edition of the chart is referred to.

2. *The Light Lists*, annually published at the beginning of each year, are not corrected in the depôts before issue, but appendices are issued every two months, giving the alterations that have taken place, copies of which are put into the chart boxes.

It is the duty of the navigating officer when he receives the set of charts to make notations in the light lists from these appendices, and from the Notices to Mariners in the box; and to keep them so corrected from time to time.

The Light Lists should always be consulted as to the details of a light, as the description in the Sailing Directions may be obsolete, in consequence of changes made since publication.

3. *The Sailing Directions* are not corrected before issue, except occasionally for very important new rocks or dangers. Hydrographic Notices and Supplements referring to each volume are published from time to time.

Supplements contain all the information received up to date since the publication of the volume to which they refer, and cancel all previous Hydrographic Notices.

Hydrographic Notices contain all information up to date since the publication of the volume, or since the last Supplement or Hydrographic Notice, but endeavour is made to issue no more than one of these affecting each volume, and, on the collection of fresh information, to include the former Notice in a Supplement.

The existence of Supplement or Hydrographic Notices is to be noted, in the tabulated form placed for the purpose inside the cover of each volume, in cases when such notations have not

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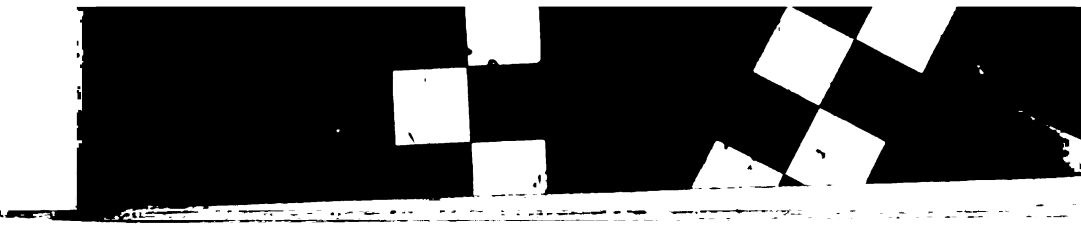

Notes should be made in the margin of the volume of sailing directions affected, as references to the Supplements or Hydrographic Notices when the latter are printed on both sides.

To enable the books to be more conveniently corrected, however, such Supplements and Hydrographic Notices as are of moderate size are now being printed on one side only, and two copies are issued to each ship; one to cut up, the slips being pasted in at the appropriate place; the other to retain intact for reference.

To make these notations or paste in these slips is one of the early duties of a navigating officer after drawing his box of charts and books, and similar notes are to be made from Notices to Mariners that may thereafter be received.

It must, however, be thoroughly understood that sailing directions will never be correct in all details, except up to the date of the last Hydrographic Notice or Supplement, and that, as already stated, when differences exist, the chart, which should be corrected from the most recent information, should be taken as the guide; for which purpose, for ordinary navigation, they are sufficient.

THE USE OF CHARTS AS NAVIGATIONAL AIDS, AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

1. *Accuracy of a Chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger is the scale of the chart.

To estimate this, the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fulness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

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Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion. This is especially the case in coral regions and off rocky coasts, and it should be remembered that in waters where rocks abound it is always possible that a survey, however complete and detailed, may have failed to find every small patch.

A wide berth should therefore be given to every rocky shore or patch, **and this rule should be invariably followed, viz., that instead of considering a coast to be clear unless it is shown to be foul, the contrary should be assumed.**

2. *Fathom Lines a Caution.*—Except in plans of harbours that have been surveyed in detail, the five-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shores in such localities without taking special precautions.

The ten-fathom line is, on rocky shores, another warning, especially for ships of heavy draught.

Charts where no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided, especially if ringed round, as there is no knowing how closely the spot may have been examined.

3. *Chart on largest scale always to be used.*—It sometimes happens that, from press of work, only the copper plate of the larger scale

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re-arrangement of coastline or soundings. This is an additional reason, besides the obvious one of the greater detail shown on a larger scale chart, why this largest scale chart should always be used for navigating.

4. *Caution in using small Scale Charts.*—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile. This is particularly to be observed when coming to an anchor on a narrow ledge of convenient depth at some distance from the shore.

For the same reason bearings to objects near should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

5. *Distortion of Printed Charts.*—The paper on which charts are printed has to be damped. On drying distortion takes place, from the inequalities in the paper, which greatly varies with different paper and the amount of the original damping; but it does not affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree, when carefully plotted upon the chart, especially if the lines to objects be long. The larger the chart the greater the amount of this distortion.

6. *Buoys.*—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should therefore be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings or angles of fixed objects on shore and not by buoys.

7. *Lights.*—Circles drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely indicate, in the case of lights which do not show equally in all directions, the bearings between which the variation, or visibility, or obscuration of the light occurs.

All the distances given in the Light Lists and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to height at end of each

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Light List, affords a means of ascertaining how much more or less the light is visible should the height of the bridge be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its order, as given in the Light Lists, and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus, a light standing 200 feet above the sea and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of any power. (*See* table in Light List above-mentioned.)

8. *Fog Signals.*—Sound is conveyed in a very capricious way through the atmosphere. Apart from wind, large areas of silence have been found in different directions and at different distances from the origin of a sound, even in clear weather. Therefore too much confidence should not be felt in hearing a fog signal. The apparatus, moreover, for sounding the signal often requires some time before it is in readiness to act. A fog often creeps imperceptibly towards the land, and is not observed by the people at a lighthouse until it is upon them; whereas a ship may have been for many hours in it, and approaching the land. In such a case no signal may be sounded. When sound has to travel against the wind, it may be thrown upwards; in such a case, a man aloft might hear it when it is inaudible on deck.

Taken together, these facts should induce the utmost caution in closing the land in fogs. The lead is generally the only safe guide.

9. *Tides and Tidal Streams.*—In navigating coasts where the tidal range is considerable, caution is always necessary. It should be

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The turn of the tidal stream off shore is seldom coincident with the time of high and low water on the shore. In open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by three hours, forming what is usually known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

In crossing a bar or shallow flats, the table (B) at page 98 of the Tide Tables will be found of great assistance in calculating how much the water has risen or fallen at any hour of the tide.

On coasts where there is much diurnal inequality in the tides, the amount of rise and fall can never be depended upon, and additional caution is necessary.

It should also be remembered that at times the tide falls below the level of low-water ordinary springs. This always occurs in temperate regions at the equinoxes, but wind may produce it at any time, and the amount varies with locality. When the moon's perigee coincides with the full or new moon the same effect is often produced.

10. *Current Arrows* on charts only show the most usual or the mean direction of a tidal stream or current. It must never be assumed that the direction of a stream will not vary from that indicated by the arrow. In the same manner, the rate of a stream constantly varies with circumstances, and the rate given on the chart is merely the mean of those found during the survey, possibly from very few observations.

11. *Fixing Position.*—The most accurate method of fixing a position relative to the shore is by angles between well-defined objects on the chart. All ships are now being supplied with a station pointer, and this method should be used whenever possible.

Two things are, however, necessary to its successful employment. First, that the objects be well chosen; and second, that the observer is skilful and rapid in his use of the sextant.

For the former, reference can be had to the pamphlet on the use of the station pointer, which is in every chart box.

The latter is only to be obtained by practice.

It will readily be seen that in war time, when the compass may be knocked away, or rifle-fire may make it undesirable to expose the person more than necessary, a sextant offers great advantages, as

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angles can be obtained from any position whence the objects are visible. It is this contingency that makes it especially desirable that all navigating officers should become expert in this method of fixing a ship's position.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

It is not intended that the use of the compass to fix the ship should be given up; there are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. In all cases where great accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal, or of additions to a chart, as fresh soundings or new buildings. In all such cases angles should be taken to several objects, the more the better; but five objects is a good number, as the four angles thus obtained not only prevent any errors, but they at once furnish a means of checking the accuracy of the chart itself. In the case of ordinary soundings, it is only necessary to take a third angle now and then; firstly, to check the general accuracy of the chart as above stated; secondly, to make certain that the more important soundings, as at the end of a line, are correctly placed.

Sometimes, when only two objects are visible, a compass bearing and sextant angle may be used with advantage.

In passing near a point of land, or an island, the method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "four-point bearing," when the bearing is taken four points on the bow, and on the beam, the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives an excellent fix for a departure, but does not ensure safety, as the point, and probably the rocks off it, are abeam before the position is obtained.

By taking the bearings of two points and four points on the bow, a very good position is obtained before the object is passed; the distance of the latter at the second position being, as before, equal to

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A table of factors, by which to multiply the distance run, to obtain the distance of the object when any number of degrees between the two bearings has been observed, is now supplied in all chart boxes.

The use of a danger angle in passing outlying rocks with land behind should also not be forgotten. In employing this method, however, caution is necessary, as should the chart be not accurate, *i.e.*, should the objects selected be not quite correctly placed, the angle taken off from it may not serve the purpose. It should not, therefore, be employed when the survey is old or manifestly imperfect.

In fixing by the compass, it must always be remembered that two bearings only are liable to error. An absolute error may be made in either bearing observed; errors may be made in applying the deviation; or errors may creep in in laying them on to the chart. For these reasons, a third or check bearing of some other object should be taken, especially when near the shore or dangers. The coincidence of these three lines will prevent any mistakes.

In ships still fitted with the Admiralty standard compass, the tripod supplied to hold the lamp will be found of great service in fixing position at night, as by its aid a bearing can be as accurately taken as in daylight. With Thomson's compass bearings can also be accurately observed at night. The utility of this in connection with ascertaining the change of bearing of an approaching ship's light should not be forgotten.

Amongst astronomical methods of fixing a ship's position, attention is drawn to the great utility of Sumner's method. A Sumner line, that is, a line drawn through the position (obtained by an assumed latitude and longitude by chronometer) at right angles to the bearing of the sun, as obtained from the azimuth tables, gives at times invaluable information, as the ship must be somewhere on that line provided the chronometer is correct. A deep cast at the same time may often serve to get an approximate position on the line. An early and very accurate position can be also obtained by Sumner's method, by getting longitude by a bright star at daylight when the horizon is well visible, and another longitude by the sun when a few degrees above the horizon, or by observing two or more stars at

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twilight. The Sumner lines drawn through the two positions thus obtained will, if the bearing of sun and star differ three points or more, give an excellent result.

12. *Change of Variation of the Compass.*—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a quarter of a point, but the chart plates cannot be corrected more frequently from the impossibility of making alterations too often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles. The variation chart should be consulted on this head.

13. *Local Magnetic Disturbance of the Compass on board Ship.*—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that disturbance of the compass in a ship afloat is experienced only in a few places on the globe.

Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases, that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

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It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

14. *Use of Oil for Modifying the Effect of Breaking Waves.*—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows :—

1. On free waves, *i.e.*, waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain ; as nothing can prevent the larger waves from breaking under such circumstances ; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use ; crude petroleum is serviceable when nothing else is obtainable ; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be : hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

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The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—*e.g.*, from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

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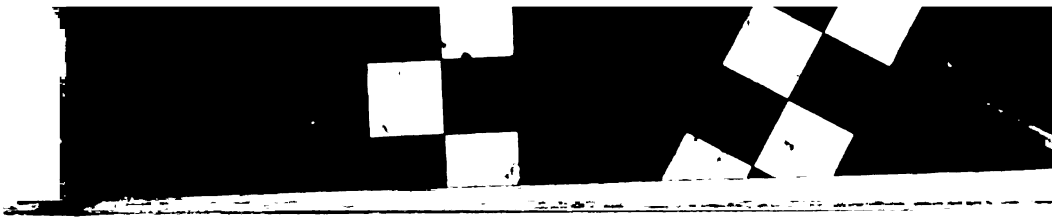

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IN THIS WORK THE BEARINGS ARE ALL MAGNETIC, EXCEPT WHERE MARKED AS TRUE.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO 100 FATHOMS, OR THE TENTH PART OF A MILE.

THE SOUNDINGS ARE REDUCED TO LOW WATER OF ORDINARY SPRING TIDES.

THE BEARINGS OF SECTORS OF LIGHT ARE GIVEN FROM SEAWARD OR TOWARDS THE LIGHT.

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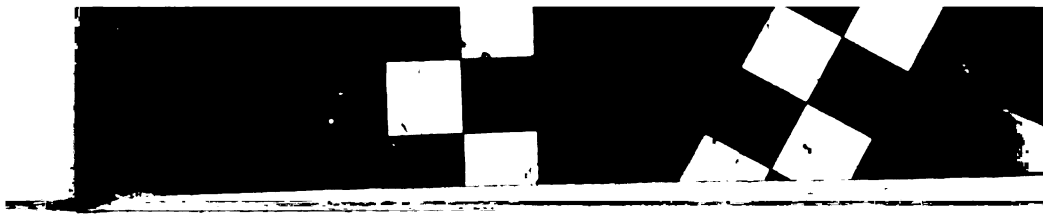

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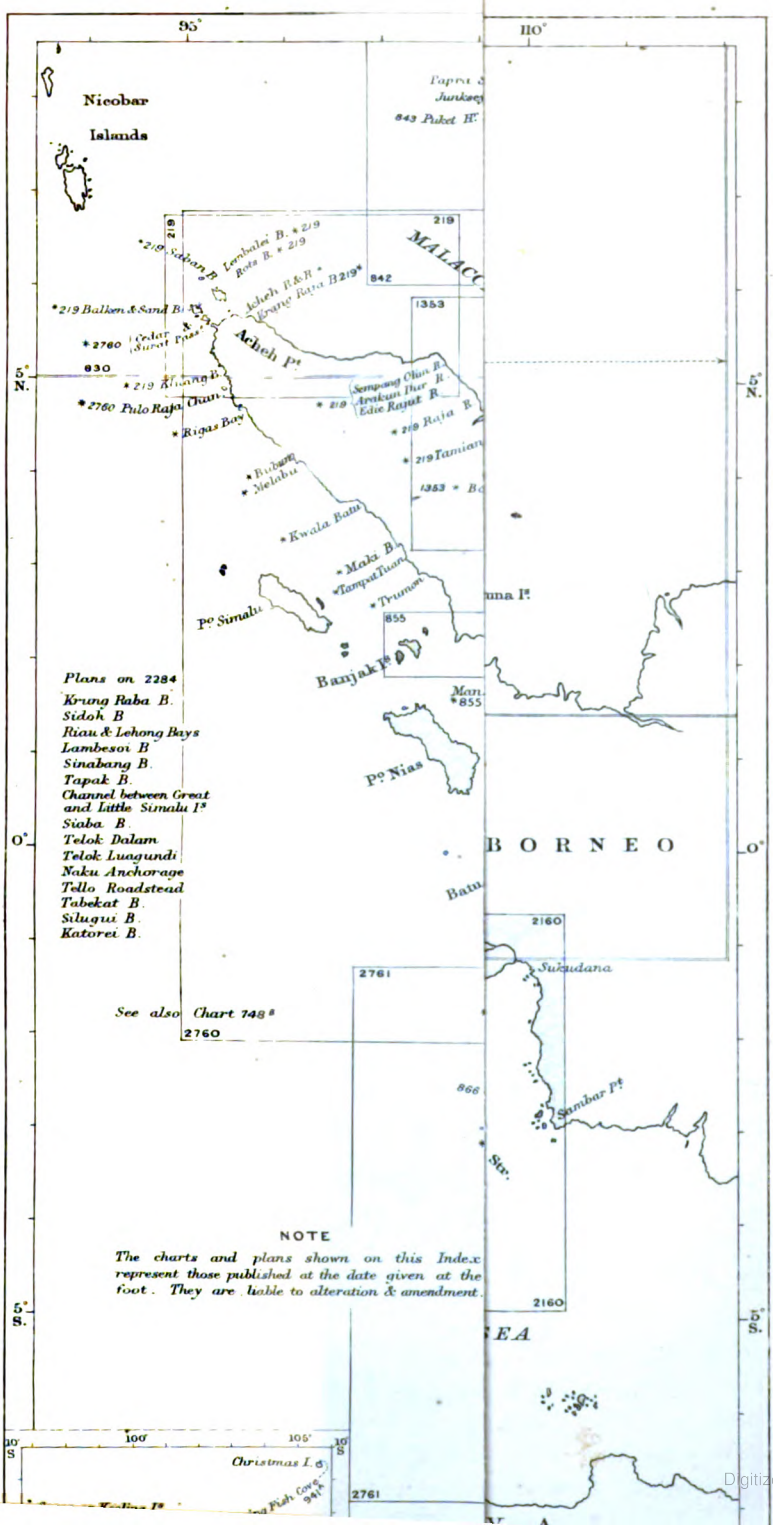

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THE

CHINA SEA DIRECTORY, VOL. I.

CHAPTER I.

STRAITS SETTLEMENTS — TRADE, COMMUNICATION, DOCKS.— NETHERLANDS INDIA, SUMATRA—TRADE, COMMUNICATION. — COAL — PILOTS — CLIMATE AND RAINFALL — WINDS AND CURRENTS—TIDES—PASSAGES.

For later information respecting the lights which are described in this work, seamen should consult the Admiralty List of Lights, Part VI.

This List is published early in the current year, corrected to the preceding 31st December.

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and Penang, British officials named Residents have been appointed, who advise the native rulers and perform certain executive duties.

SINGAPORE (native Singapura) is an island about 27 miles in length by 14 miles in breadth, containing an area of 206 square miles, and situated at the southern extreme of the Malay peninsula, from which it is separated by a strait about three-quarters of a mile in breadth. There are a number of small islands adjacent to it which form part of the settlement. The island was first occupied in 1819 and was for many years administered by officials from India. It became a Crown Colony in 1867. Owing to its geographical position and well sheltered anchorage it possesses a trade and importance out of all proportion to its area and productions.

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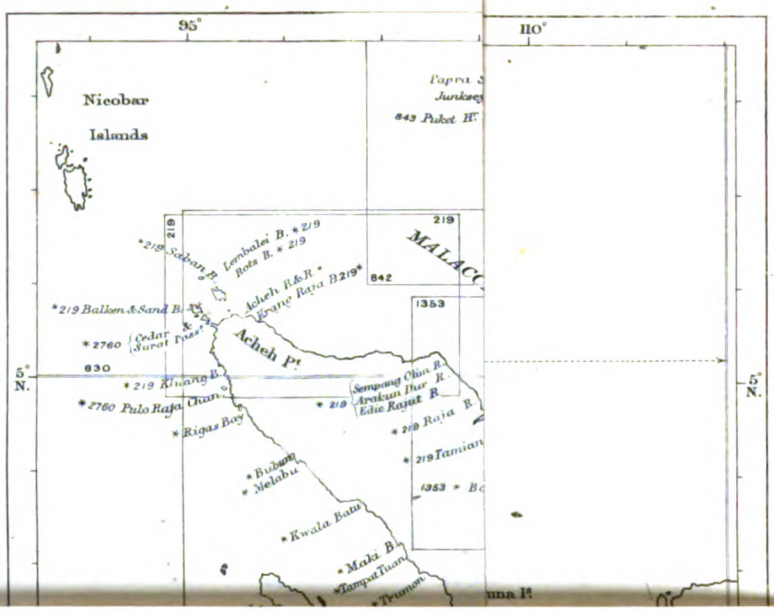

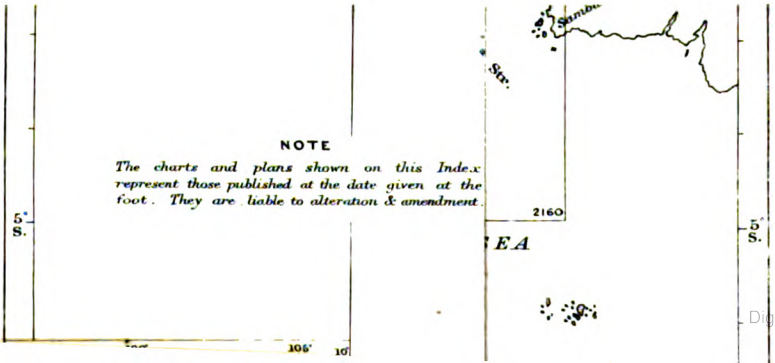

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THE

CHINA SEA DIRECTORY, VOL. I.

CHAPTER I.

STRAITS SETTLEMENTS — TRADE, COMMUNICATION, DOCKS.— NETHERLANDS INDIA, SUMATRA—TRADE, COMMUNICATION. — COAL — PILOTS — CLIMATE AND RAINFALL — WINDS AND CURRENTS—TIDES—PASSAGES.

The China Sea Directory, Vol. I., treats of the island of Sumatra and its off-lying islands, Keeling and Christmas islands, Malacca and Singapore straits, Sunda strait and the passages leading to Singapore and northward to the China sea. For Java, &c., *see* Eastern Archipelago, part II.

THE STRAITS SETTLEMENTS.

The Straits Settlements (the name given to the British possessions in the Malay peninsula) comprise Singapore, Malacca, Penang, Province Wellesley, the Dindings, the Keeling or Cocos islands, and Christmas island, and constitute a Crown colony. The Government consists of a Governor with an Executive and Legislative Council.

In the Native States (comprising an area of about 26,000,000 square miles) of Perak, Selángor, Sungi Ujong, Jelebu, the Negri Sembilan and Pahang, British officials named Residents have been appointed, who advise the native rulers and perform certain executive duties.

SINGAPORE (native Singapura) is an island about 27 miles in length by 14 miles in breadth, containing an area of 206 square miles, and situated at the southern extreme of the Malay peninsula, from which it is separated by a strait about three-quarters of a mile in breadth. There are a number of small islands adjacent to it which form part of the settlement. The island was first occupied in 1819 and was for many years administered by officials from India. It became a Crown Colony in 1867. Owing to its geographical position and well sheltered anchorage it possesses a trade and importance out of all proportion to its area and productions.

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Malacca is situated on the western shore of the Malay peninsula, between Singapore and Penang, and consists of a strip of territory about 42 miles in length and from 8 to 25 miles in breadth, containing an area of 659 square miles.

Penang is an island about 14 miles in length and from 6 to 9 miles in breadth, containing an area of 108 square miles, situated off the west coast of the Malay peninsula, between lat. 5° and 6° N., near the northern entrance to Malacca strait. On the shore of the mainland, from which the island is separated by a strait 1½ miles wide abreast Georgetown, is Province Wellesley, a strip of territory forming part of the settlement; it averages 8 miles in breadth and extends about 35 miles in a north and south direction, including 10 miles of territory southward of Krian river, the whole containing an area of 270 square miles. The chief town is Georgetown on Penang island.

The **Dindings** contain an area of 270 square miles, two-thirds forest, including the island of Pangkor and a strip of territory on the mainland, about 70 miles from Georgetown. They produce little of value except timber.

The **Cocos or Keeling islands**, taken possession of by the British Government in 1857, were in February 1886 placed under the Government of the Straits Settlements. They lie in the Indian ocean between lat. 11° 50′ and 12° 45′ S., and about long. 96° 50′ E. The largest is 5 miles in length by about a quarter of a mile in breadth. Cocoa nuts form the principal product.

Christmas island, also in the Indian ocean, in lat. 10° 30′ S., long. 105° 40′ E., annexed in 1888, was placed under the Government of the Straits Settlements in 1889.

Principal ports.—Trade.—The three ports in the Straits Settlements are Singapore, Penang (Georgetown) and Malacca; two-thirds of the trade of the colony passes through the first named. In 1892 the imports at Singapore, Penang, and Malacca, amounted in value respectively to $106,970,062, $41,421,576, and $1,682,288; the exports to $97,850,449, $43,674,818, and $1,486,700.

The explanation of so extensive a trade, in proportion to the size of the settlements, and of the leading position of Singapore, is found in the fact that Singapore is an *entrepôt*, whither the mineral and

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Europe, and whence, in like manner, the manufactured goods of Europe are distributed to the countries just named.

Shipping.—The shipping entered and cleared during the year 1892 amounted to 11,093,633 tons, of which 7,121,567 were British. The steam tonnage (native craft excluded) amounts to about 95 per cent. of the whole. No customs duties are levied in the colony, nor are any tonnage dues payable, excepting a small charge for the maintenance of the lighthouses.

Communication.—Over 50 lines of sea-going steamers touch at Singapore. The three great steamship companies trading to the East—the P. and O. Steam Navigation Co., the Messageries Maritime, and the North German Lloyd—connect the Straits Settlements with England, France, and Germany on the one hand, and with China and Japan on the other. By the same steamers, and by the British India, Austrian Lloyd, &c., there is constant communication with India. By the Queensland Royal Mail Line there is monthly communication with Brisbane, and so with the whole continent of Australia. There is frequent communication with Batavia by the British India, Netherlands India and other vessels.

Letters from England reach Singapore in 26 days.

Railways and telegraphs.—Singapore and Penang are both in connection with the cable of the Eastern Extension Telegraph Co. (China, Batavia, Australia), and have thus telegraphic communication with the rest of the world. Labuan is now also connected with this system. There is a complete telegraphic system through the Protected Native States, which is connected with that of the Straits Settlements. Telephones are in use in all parts of the Settlements. *See* telegraphs with Sumatra, p. 9.

There are no railways in the Straits Settlements. In Pérak there is a line 17 miles in length—from port Weld *viâ* Thaipeng to Ulu Sapeting, 9 miles; from Telok Anson to Tapah, 16 miles; and from Ipoh to Batu Gajah, 8 miles, with a branch line connecting Lahat (about 2 miles) with the main line under construction from Batu Gajah to Tapah. In Selángor a railway connects Kwala Lumpor, the capital, with the port of Klang, a distance of 22 miles; and from the capital to Serendah, an important mining centre, 25 miles. In Sungi Ujong a line of 23 miles connects port Dickson with the capital, Seremban. Extensions of the railway in Pérak and Selángor are in progress, and an important line has been surveyed to connect the east and west states of the peninsula.

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Docks.—There are five graving docks in the Straits Settlements the particulars of which are as follows:—

Place.	Length on blocks.	Breadth of entrance.	Depth of water on sill, O.S.T.	Owners—Remarks.
Singapore—	feet	feet	feet	
Victoria - - -	450	65	20	Tanjong Pagar Dock Co., Limited.
Albert - - -	470	60	21	
No. 1 - - -	444	65	19	New Harbour Dock Co., Limited.
No. 2 - - -	415	42	14½	Patent slip at Tanjong Rú will take vessels of 500 tons.
Province, Wellesley, Prye river dock.	250	50	14½ (12½ on blocks)	Prye River Dock Co., Limited. Patent slip for small craft, 100 feet in length but not exceeding 200 tons burthen.

NATIVE STATES.

PÉRAK, pronounced Perah, is the most northerly of the protected states on the west coast of the Malay peninsula, between Province Wellesley and Bernam river, Selángor. The state is well watered, the Pérak, Kinta, Krian and Bernam being the chief rivers. The hills on the eastern boundary, being part of the main range of the peninsula attain a height of 8,000 feet.

The chief export is tin, worked by great numbers of Chinese. Sugar and rice are extensively grown, and tea and coffee plantations have been started with success. Larat and Kinta are the chief mining districts, the tin from the former being shipped at port Weld, the port of Thaipeng, which is the head-quarters of the Government, and from the latter at Telok Anson 30 miles up the Pérak river. A battalion of Sikhs perform the police duties of the State. There is a British Resident at Kwala Kangsa.

Trade.—The revenue in 1892 amounted to $2,686,565 and the expenditure to $2,049,490. The exports amounted in value to

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See railways, p. 3

SELÁNGOR lies southward of Pérak. In this State, as in Pérak, the appointment of a British Resident in 1874 followed on the anarchy arising out of disputes connected with the tin mines. The State is drained by four rivers, the Bernam, Selángor, Klang, and Langat. Where the state touches the central range of the peninsula, there are several peaks of over 5,000 feet, and one of 6,200 feet. The chief town is Kwala Lumpor, which is the largest and best built town on the mainland of the peninsula. It is connected by railway with Klang, its port. Kwala Lumpor and Langat are the chief mining centres. Rice, coffee, pepper, and sugar are the principal agricultural products.

Trade.—The revenue in 1892 amounted to $2,135,448 and the expenditure to $2,044,115. The exports amounted in value to $8,060,428 and the imports to $7,393,679. *See* railways, p. 3.

SUNGI UJONG lies between Selángor and Malacca, which, like Pérak and Selángor, suffered prior to 1874 from intestinal troubles, when a British Resident was appointed. In 1885 the State of Jelebu was placed under the Resident of Sungi Ujong.

The only river of any importance is the Lingi. The tin mines are worked by Chinese, whilst the Malay population is almost entirely agricultural. Coffee has been successfully planted and there are many tapioca estates.

The Residency is at Seremban, which is connected with port Dickson by a railway.

Trade.—The revenue in 1892 amounted to $354,184 and the expenditure to $361,143. The exports amounted in value to $1,883,723 and the imports to $1,797,767. *See* railways, p. 3.

NEGRI SEMBILAN is an inland state (within Malacca), consisting of nine states, as the name implies. One half is very mountainous and the other undulating. Tin mining is still in its infancy, though its deposits are said to be rich. Tapioca is extensively grown. Gold reefs are said to have been discovered in Gemencheh on the Moar river. The head-quarters of the Resident are at Kwala Pileh.

Pahang is the largest of the protected States; but its coast is included in volume II.

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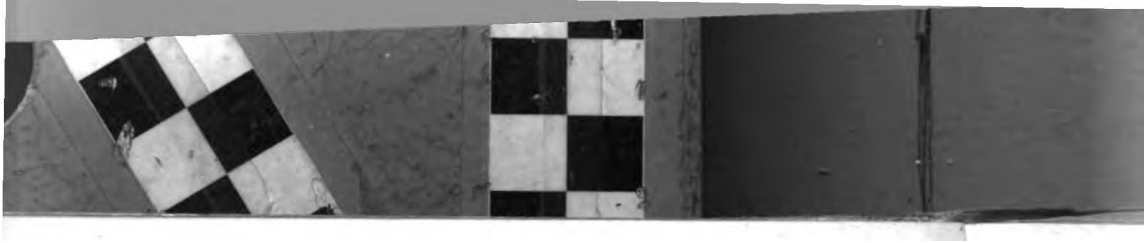

JOHOR lies between Moar river in Malacca strait and the south-east extreme of the Malay peninsula. The Sultan of Johor placed his foreign relations in the hands of the British Government in 1857. The capital, in which the Sultan resides is Johor Bahru, in Old strait or Salat Tebrau, about 15 miles northward of Singapore. The Sultan is assisted by a Council of State, composed of chiefs and nobles, mostly heads of Government departments.

Trade.—For the past 20 years the commercial prosperity of Johor has been steadily increasing. The exports are principally gambier and pepper. In 1890, 21,577 tons of the former and 9,236 tons of the latter were exported; other exports are copra, coffee, tapioca, india-rubber, &c.

POPULATION.—The population of the several Settlements and States, with that of the principal races, in 1891 was as follows :—

Settlement or State.	Area.	Total.	Europeans.	Malays.	Chinese.	Natives of India.
Singapore	—	184,534	5,254	35,992	121,908	16,035
Malacca	—	92,170	134	70,325	18,161	1,647
Province Wellesley...	—	111,732	104	70,970	23,593	16,354
Penang	—	123,886	1,097	35,786	64,327	19,861
Pérak	7,950	214,254	—	—	—	—
Selángor	3,000	81,592	—	—	—	—
Sungi Ujong ...	660	23,602	—	—	—	—
and Jelebu	500					
Negri Sembilan ...	2,000	41,617	—	—	—	—
Pahang	10,000	57,462	—	—	—	—
Johor	—	300,000	—	—	—	—

NETHERLANDS INDIA.

SUMATRA ISLAND.—Sumatra was first visited in 1509 by the Portuguese; by the Dutch in 1600; and by the British two years afterwards. The latter continued to establish factories and form settlements in the island during the 17th century. These settlements

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Sumatra is about 960 miles in length in a north-west and south-east direction, its greatest breadth about 220 miles, and its area is about 128,000 square miles; thus it is the largest of the islands of the Malay archipelago, except Borneo, and is about three times the size of Java. The equator passes nearly through the centre of the island.

A chain of mountains extends the whole length of Sumatra, the ranges being in many parts double and treble, but in general situated much nearer to the western than to the eastern coast. Some of the mountains rise to the height of 10,000 feet above the level of the sea; of these, five situated near the centre of the island, are volcanic. Only one of these is known to be active, namely, Gunong Gredong on the west coast of Acheh. The great alluvial plain on the eastern side of the island, generally only a few feet above the level of the sea, is 600 miles in length and from 60 to 110 miles in width: this, with the rare exception of a few patches on the river banks, and usually beyond the reach of the tide, is covered with a stupendous forest of primeval origin. The south-eastern extremity of the island is little better than a forest of mangrove growing out of a morass. The greater part of the island is a sterile or intractable wilderness, and considering its size the country is thinly populated.

The principal rivers of Sumatra are those on its eastern side, of which Siak and Palembang are the largest; these are navigable by vessels of fairly moderate draught. On the western coast there are many small rivers, but none of any importance. All the Sumatran rivers have bars of mud or sand at their mouths, which forbid their navigation by vessels of much draught, and some on the eastern coast are subject to a small bore or tidal wave.

The Population of Sumatra, estimated at two and a half millions, consists of fifteen different nations speaking as many different languages. Six of these nations have made some progress in civilization, being possessed of the art of writing and of some of the mechanical arts. These are the Malays, the conquerors of the island, estimated at 900,000; the Achinese, at the north end of the island, 450,000; the Bátak, 300,000; the Palembangs, 200,000; the Rejang, 70,000; and the Sarawi, 160,000; others, chiefly those living in the mountainous regions of the island, are but little removed from the savage state.

The villages are invariably built on the banks of some river or lake, and consist of houses built chiefly of bamboo raised off the ground.

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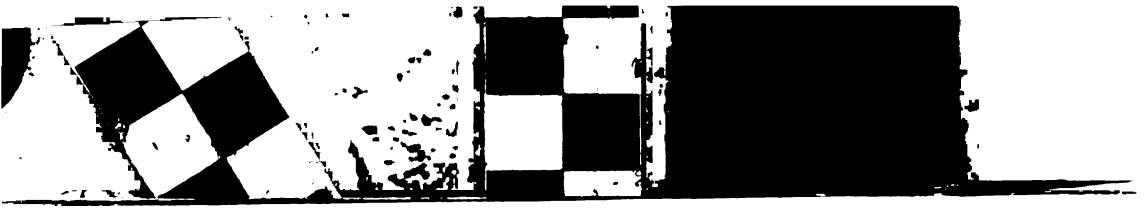

CAUTION.—The natives in certain portions of Sumatra, more articularly on the west coast, are stated to be cruel and treacherous, nd trading vessels cannot be too much on their guard. Armed men hould never be allowed on board, nor unarmed men in any great umbers. Although piracy has been much reduced since the stablishment of Dutch rule, there have been treacherous attacks on essels during the last few years.

Trade.—Produce.—Buffaloes are the most important live stock. The breed of horses is small, but well made and hardy. Sheep also re small. The hog and goat are both domestic and wild. Elephants, nd many species of deer abound. Tigers, rhinoceroses, hippopotami, rang-útans and other species of the monkey tribe, bears, and other nimals in great variety are met with.

Sumatra has been in all ages famous for gold, which with copper, ron, sulphur, saltpetre, coal of indifferent quality, appear to be the hief mineral products. Among the vegetable products the most mportant are pepper and tobacco, the principal pepper ports being n the west coast. Deli, on the east coast, is the centre of the tobacco istrict. Rice and sago are the chief species of grain grown; millet s cultivated in small quantities. The cocoa nut, betel, bamboo, sugar ane, and an abundance of tropical fruits, are indigenous.

The chief articles of export are pepper, tobacco, hides, coffee, utmegs, rattans, coral, rice, camphor, gutta-percha, and copra. The imports are chiefly woollen goods, wines, beer, spirits, tin-ware, lothing, rice, metals, hardware, and cutlery.

The value of the imports and exports from and to the several districts of Sumatra, &c., in 1894, in guilders, 12 of which=£1 sterling, vas as follows:—Imports—Sumatra, west coast, 6,714,811; Sumatra, ast coast, 16,527,076; Palembang, 2,233,966; Lampong, 16,968; nd Rhio and neighbouring islands, 1,342,408.

Exports—Sumatra, west coast, 5,303,196; Sumatra, east coast, 7,180,534; Palembang, 3,074,681; Lampong, 10,690; and Rhio and neighbouring islands (Linga, &c.), 2,578,084.

Communication.—Mails.—Fortnightly from Batavia to Telok Betung, Kroë, Benkulen, Padang, Olehleh, Segli, Edi, and back, calling at same ports. Once every three months the steamer calls at Engano instead of Kroë.

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From Padang there is a steamer fortnightly to Singapore, calling

Sitolo (*pulo Nias*), Trumon, Tampat Tuan, Susu Susu, *Analabu* (*Melabu*), *Olehléh*, and *Penang*. From Singapore back to Padang calling at same ports. Those in italics on each voyage, the others once in four weeks.

Muntok and Rhio, fortnightly with Singapore, by vessels running between Singapore and Batavia. Muntok and Palembang every 9 days with Batavia. Every month from Palembang with Muara Saba, Simpang and Jambie, and back by same ports. Batavia to Belawan direct fortnightly.

A steamer from Belawan makes the following coasting trip fortnightly:—To Deli, Edi, again to Deli, Asahan, Bila, Paneh, Bengkalis, Singapore; Bengkalis, Siak, Panei river, Bila, Asahan, Deli. Edi, Panei river, Bengkalis, and Siak, are called at only every 4 weeks.

Telegraph.—Acheh, Singkel, Siboga (Tapanuli) Padang, Moko-Moko, Telok Betung, on the west and south coasts, and Palembang and Deli (Medan), on the east coast, are connected with Kalianda, in Sunda strait, by land lines; thence by submarine cable to the Java coast, 5 miles southward of Fourth point; thence by land lines with Batavia; thence with other parts of the world. Acheh is connected with Deli, on the east coast, by submarine cable; thence with Penang, thus connecting the principal places in Sumatra with the Eastern Extension Telegraph Co.

Uniform system of buoyage. — The following uniform system of buoyage has been adopted, and will be carried out in the fairways of the Netherlands East Indies:—

1. The term starboard hand means that side which would be on the right hand going with the main stream of flood, or in entering a harbour, river, or estuary, from seaward; the term port hand means the left hand side, under the same circumstances.

2. Conical (nun) buoys are starboard hand buoys as thus defined, and are painted red.

3. Can (truncated) buoys are port hand buoys as thus defined, and are painted black.

4. Spherical buoys mark the ends of middle grounds, and are painted black and red in horizontal stripes. These buoys are always surmounted by top marks, other buoys only in special cases.

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5. Buoys lying outside, and marking the approach to, seaward channels are of a special shape, and are painted red and black in vertical stripes.

6. The buoys marking the outer shoals remain as at present.

7. Wrecks are marked by conical or can buoys, painted green according as the wreck lies on the starboard or port side of the fairway. Should the wreck be in mid channel, it will be marked by a can buoy on one side, and a conical buoy on the other side, which buoys are to be treated as port or starboard hand buoys according to shape.

8.—The top marks are as follows :—

A diamond marks the outer or seaward side of a bank.

A cone marks the inner side of a bank.

A ball marks the starboard side of the fairway.

A truncated cone marks the port side of the fairway.

A cross is used as a special mark, and surmounting a spherical buoy indicates that the buoy may be passed on either side.

The ball and truncated cone are also used as top marks for beacons.

The top marks are of the same colour as the buoys or beacons on which they are placed.

9. The buoys of sea channels will be numbered consecutively (beginning from seaward), and marked by the first letter of the name of the channel. The numbers and letters will be white.

This uniform system of buoyage will gradually be adopted, as regards the shape of the buoys and top marks, whilst the alteration in colour will only be made when all else has been changed in accordance with the new system. For this reason, it is necessary during the period of transition, that attention should be exclusively given to the colour (as has hitherto been the case), and not to the

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Caution.—All floating marks such as light-vessels, buoys and floating beacons are liable to break away or to be out of position; too much dependance therefore should not be placed on any of those mentioned in this work.

Port Regulations.—Netherlands India.—Vessels coming from any port outside of Netherlands India are forbidden to communicate with the shore before obtaining permission from the Commander of the guard-ship, or in case there is no guard-ship in the road, from the Harbour Master.

Every vessel without a bill of health or with an unsatisfactory bill of health shall be subject to the regulations of quarantine. Every vessel from a foreign port is to be provided with a bill of health countersigned by the Dutch Consular officer at the port of departure.

COAL is obtainable in any quantity at Singapore and Penang, and quantities of over 500 tons are kept at Acheh, and Padang in Sumatra. Small quantities are kept at Deli, Bengkalis, Singkel, Tapanuli, Telok Betung, Palembang, Jambie and Indragirie in Sumatra; and at Muntok, Linga, Rhio, and Kalmoa island in Cheru-chup bay.

PILOTS.—The statement in certain places in Admiralty Sailing Directions that the employment of pilots is compulsory, does not apply to H.M. Ships-of-War. Experience has shown that but little confidence should be placed in the natives who offer themselves as pilots on the west coast of Sumatra. Men, however, holding licenses as pilots for this coast are obtainable at Padang.

CLIMATE AND RAINFALL.

STRAITS SETTLEMENTS.—The Malay peninsula is subject to the influence of both monsoons, but owing to counteracting causes they are not so much felt as in many other places.

The Climate of the Straits Settlements, situated in the neighbourhood of the equator and exposed to the sea is both hot and moist. The damp heat is distinctly enervating to European constitutions, and care must be exercised by those who would enjoy good health.

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The variations of temperature are small; observations at Singapore ring a series of years show a mean maximum of 86°·3 and a mean nimum of 73°·1, giving a daily range of 13°·2. The highest and west shade temperature observed in seventeen years have been and 63°·4.

Observations at Penang show a mean maximum of 88°·6, and a an minimum of 74°·6, giving a daily range of 14°.

There is little difference of temperature during the twelve months, r are the seasons, more particularly at Singapore, divided into wet d dry seasons as is usual in tropical countries. Towards Penang d northward of it the seasons are more marked.

Rain falls throughout the year. Observations taken during the 2 years, 1869–90, show that the average number of rainy days in he year, at Singapore, the east extreme of the Straits Settlements 167, and the average annual rainfall is 91·8 inches. The average onthly rainfall ranges from 6·2 inches to 10·2 inches; November nd December have the heaviest, and February and March the ghtest average fall. During the same period the extremes have een the year 1870, with 209 rainy days and an aggregate fall of 23 inches, and the year 1877, with 119 days and an aggregate fall only 58·4 inches.

Observations taken at Penang, the west extreme of the Straits ettlements, during the years 1885–87, show the average number of iny days to be 177, and over a period of nine years, ending 1890, e average annual rainfall is 111·8 inches. The average monthly ainfall ranges from 2·8 inches to 19·1 inches; September and ctober have the heaviest, and February has the lightest fall.

The rainfall in 1890–92 in the several Settlements was as follows:—

	1890.	1891.	1882.
	Inches.	Inches.	Inches.
ngapore	117·78	88·48	99·7
enang	139·69	126·69	93·99
rovince Wellesley	100·40	103·91	75·05
alacca	72·29	81·09	78·35
he Dindings	82·29	77·39	99·09

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Barometer.—There is very little change in the mean annual range of the barometer in the Straits Settlements. At Singapore, for the 10 years ending 1890, it varied from 29·863 inches in 1882 to 29·892 inches in 1888. At Penang the variation is practically the same.

At Junkseylon, in Siam, the south-west monsoon prevails from May to October or November, and the north-east monsoon, from December to April. The rainy season extends from May to December, the maximum number of days rain being from 18 to 20, in the month of August.

From January to March, inclusive, is its dry and most unhealthy season, August is the hottest month, the mean temperature being about 82°; there is but little variation.

Pérak.—The climate of Pérak state is hot and moist, but except at the bases of the mountain ranges where there is always more or less malaria, is not unhealthy. It is more favourable for Europeans than that of most tropical countries. The Malays and Chinese suffer from febrile attacks, scrofulous affections and ulcers on the legs. Being protected by the high mountains of Sumatra on one side and the range forming the backbone of the peninsula on the other, the country is only subject to the usual land and sea breezes, calms and variable winds, interrupted by occasional squalls.

In the low country the temperature seldom rises higher than 86° in the shade, while at night it frequently sinks to 65°, on the hills being proportionately less. The rainfall is greatest from August to December, but rain falls during every month of the year.

Selángor.—The climate is similar to that of Pérak. The rainfall, which averages in the centre some 100 inches, varies greatly on the coast and mountains; thus in 1888, the maximum at Klang was 49 inches, that at Ula Selángor in the mountains 323 inches.

Sungi Ujong.—The mean temperature at Seremban is 81° the extreme range being 16°. The rainfall in 1889 was 82 inches, that in the State of Jelebu being only 53 inches. In Jelebu the temperature is rather lower and the rainfall considerably less than in Sungi Ujong.

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Negri Sembilan.—The rainfall is probably much the same as in
agi Ujong, and the temperature rather less.

Sumatra.—The climate, more particularly on the low-lying flats
ming the east coast of Sumatra, is unhealthy, but the heat is not
great as might be supposed from its being under the equator. The
incipal scourge is tropical fever, which never ceases to work havoc
ong Europeans and natives alike ; the attacks are sudden, lasting
out a week, and sometimes fatal ; dysentery is also prevalent.
olera is always more or less endemic, at times assuming an
idemic form, and carrying off large numbers of natives. It is
cessary, therefore, to use every precaution to preserve the health of
e crew, should any stay be made on the coast. Landing, or sleep-
g on shore, or on deck at night except under awnings, should be
oided. The water from ponds or wells near the shore is very bad,
d running water should be procured if possible and invariably
oiled for drinking.

The interior of the island is comparatively cool and pleasant.

The climate of the north coast of Sumatra (Acheh district) is damp
d also unhealthy. The mean temperature ranges from 77° to 95°,
d is subject to great and sudden changes, and is very different in
fferent localities. On the north and north-west coast the months
March and April are very hot ; on the east coast the whole period
the south-west monsoon is the same. The climate is not every-
here equally unhealthy, for instance, it is noteworthy that during
idemics, the mortality is low at Olehléh, as compared with the
eighbouring Kota Raja, while there is comparatively little malaria
Olehléh. The extremely damp months of the latter half of the
ear are most favourable to the development of malaria, and beri-beri
n acute disease producing great muscular debility and painful
gidity of the limbs, &c.), whereas the months of January and
ebruary are generally healthier.

Rigas on the west coast has the reputation of being one of the
ost unhealthy ports ; Benkulen on the same coast is but little better.
adang, on this coast, is one of the least unhealthy ; here, in the
ghlands, the temperature is seldom above 70° to 80° in the middle
the day.

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Sumatra does not correspond with the periods of the monsoons; there is, however, a certain regularity in the increase and decrease of the proportion of wet days in the course of the year.

The greatest rainfall on the north coast of Acheh and the off-lying islands usually occurs in the months of October and November, the months preceding the change to the north-east monsoon, and the least rainfall in February and March, the months preceding the change to the south-west monsoon. The rainfall on the off-lying islands is about double that on the north coast. *See* table of rainfall, p. 16.

On the east coast of Acheh, where the monsoons are a little later, the rainfall is heaviest in November and December.

There is no more connection between the rainfall and the prevailing monsoon on the west coast of Acheh than on the north and east coasts; moreover, the rainfall does not at all depend on the time of year there. In general there is not much difference in the average rainfall in different months. All that can be stated is, that on the northern portion, between Acheh head and about lat. 4° N., the rainfall is less (per month) during the first four months than during the rest of the year, and that February may be called a dry month.

Between about lat. 2° N. and Sunda strait, the heaviest rains occur from October to December, or about the same as farther north, but the dry month is July.

In Sunda strait the wet season is nearly the whole of the north-west monsoon period, or from November to April. *See* table, p. 16.

The way in which the rain falls on the west coast of Sumatra differs with the prevailing monsoon. During the north-east monsoon it is generally dry during the day, the rain falling during the early hours of the night; vessels are mostly outside its limits if at a considerable distance from the shore.

During the south-west monsoon, especially from September to November, inclusive, the sky is overcast both day and night and the weather squally. The rain is violent sometimes for several consecutive days.

The following table gives the months of maximum and minimum rainfall for the year 1893 at the principal ports of Netherlands India

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braced by this volume. The number of days increase and decrease he months quoted, and there is no actually dry season :—

Place.	Lat., Approx.	Months in which maximum rainfall occurred. Average number of days per month.	Months in which minimum rainfall occurred. Average number of days per month.	Total fall in inches.
Olehléh . coast Sumatra).	5½° N.	Sept.—Dec. 13 15	Feb. to Apl. 6 8	66*
Singkel '. coast Sumatra).	2¼ N.	Sep.—Dec. 17 20	Feb.—June and July 12 13 14	178
Siboga '. coast Sumatra).	1¾ N.	Sep.—Dec. 17 23	July 13	178
Padang V. coast Sumatra).	1 S.	Sep.—Dec. 16 20	July 10	180
Benkulen V. coast Sumatra).	4 S.	Oct.—Dec. 18 20	July 11	128
Telok Betung (Sunda strait).	5½ S.	Dec.—Apl. 16 18	July 8	82
Java 1st pt. (Sunda strait).	6½ S.	Nov.—Feb. 16 21	Aug.—Sep. 8	137
Palembang E. coast Sumatra).	2½ S.	Nov.—Dec. 19 21	July 8	106
Bengkalis umatra E. coast).	1½ N.	Sep.—Dec. 18 20	Feb. 9	104
Medan umatra E. coast).	4 N.	Aug.—Dec. 17 19	Feb.—Mar. 7 8	80
Edi umatra E. coast).	5 N.	Oct.—Dec. 16 18	Feb.—Apl. 4 7	80
Muntok (Banka I.)	2 S.	Nov.—Dec. 19 23	July—Sep. 8 10	120
Manggar (Belitung I.)	3 S.	Nov.—Mar. 16 20	Aug.—Sep. 6 8	100

* On the islands off the north coast the fall is about double that at Olehléh.

Swell.—At the north and north-east portion of Sumatra, during e north-east monsoon there is generally a swell on the coast, which ves rise to a considerable sea in the afternoon if accompanied by stiff sea breeze. Both subside quickly so that the water is generally nooth at night and in the forenoon. At times the monsoon blows rongly for some days, at which times communication with the shore impracticable. December and January are the worst months. If ... all boats should be hoisted up. The

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At the north-west end of Sumatra, between Acheh head and Pedro point, the south-west monsoon at times throws a high sea on to the coast, rendering it necessary for vessels at anchor off Olehléh to shift farther out; a squall sometimes comes from the north-west rendering it a lee shore, and the water will break in a depth of about 3 fathoms.

On the west coast there is nearly always a swell from north-west or south-west. During the south-west monsoon they often come from both directions at the same time, causing a heavy sea and breakers on the coast. May, June and July are the worst months.

During the north-east monsoon good anchorage and calm waters may nearly always be found near the shore. This monsoon is the favourable one for trade and navigation, but native boats should be used for landing or embarking cargo.

WINDS.

INDIAN OCEAN.*—The south-east trade wind which in the Indian ocean extends from the west coast of Australia to within a few degrees of Madagascar, will be found between the parallels of 4° and 25° South, from April to September, and between 10° and 30° South, from November to March. To the southward of this trade, as far as 60° or 70° S., the prevailing winds are westerly, which will be found with more or less force and irregularity at all seasons.

The Monsoons southward of the equator blow from South-east from the middle of April till the middle of September, and from North-west varying to W.S.W. from October to March.

The South-east or easterly monsoon, which is the period of fine season, may be considered an extension of the south-east trade, blowing within three or four degrees of the equator when the sun is near the northern tropic, and receding to 10° or 11° S. when the sun is near the southern tropic.

The North-west or westerly monsoon is subject to many irregularities, with occasional heavy gales, thunder, lightning, and rain; it sometimes does not set in before November or December, rarely blowing with regularity and strength except in December and January, when it occupies a space comprised between lat. 10° or 12° S., and 2° or 3° N.

* *See* the Admiralty Wind and Current atlas for the Pacific, Atlantic and Indian oceans.

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months being almost exempt. Some of these storms form in the neighbourhood of the Keeling islands, thence, after taking a west-south-west direction, recurve either eastward of Mauritius or between it and Madagascar. Others form to the northward of Mauritius, whence they usually work southward between it and Madagascar, though occasionally one escapes northward of that island into the Mozambique channel. Others again, form off (not near) the west coast of Sumatra in 3° to 4° South latitude, whence, working south-westward, they recurve in about 80° or 90° East longitude.

The rate of progression of the greater number of these storms is from 50 to 200 miles per day, whilst others are nearly stationary; the proportion is about 2 to 1 respectively. The very marked difference in the proportion of Progressive storms to those classed as Stationary in the different months of the Cyclone season is a valuable fact for the seamen, if it can be considered established. The knowledge that in the early and late months of this season the chances are about even that a cyclone is stationary, and that in the height of the season (February) the chances are very great (about 10 to 1) that a cyclone is in rapid progression, would greatly influence the action of a vessel that finds herself in the neighbourhood of a storm; but these proportions are too strongly marked throughout the 35 years' observations that have been discussed, to admit of much doubt that the ratio between the Progressive and Stationary cyclones is different in different parts of the season, the doubt whether full information of every storm has been obtained must prevent the proportions being accepted as absolutely correct.

On the homeward route, it should be borne in mind, that if freshening north-east or easterly winds with falling barometer are met with, the vessel may be overtaking a cyclone, and as these winds often, if not always, blow towards the centre, vessels should take the necessary steps for avoiding it.

The relative frequency for the whole series of 35 years ending 1885, for the several months, are as follows. For full details, with yearly and monthly charts showing the tracks of these storms, *see*

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compiled by Dr. Meldrum, C.M.G., F.R.S., published under the authority of the Meteorological Council, 1891.

Month.	Progressive Storms.		Stationary Storms.		TOTALS.	
	Total.	Frequency.	Total.	Frequency.	Stationary and Progressive	Frequency.
October ...	2	1 in 18 years	3	1 in 12 years	5	1 in 7 years
November	12	1 „ 3 „	13	1 „ 3 „	25	5 „ 7 „
December	23	2 „ 3 „	10	2 „ 7 „	33	1 „ 1 „
January ...	52	3 „ 2 „	19	1 „ 2 „	71	2 „ 1 „
February	55	5 „ 3 „	6	1 „ 6 „	61	5 „ 3 „
March ...	40	4 „ 3 „	19	1 „ 2 „	59	5 „ 3 „
April ...	26	3 „ 4 „	24	2 „ 3 „	50	3 „ 2 „
May ...	8	2 „ 9 „	11	1 „ 3 „	19	1 „ 2 „
June ...	1	1 „ 35 „	2	1 „ 18 „	3	1 „ 12 „
July ...	1	1 „ 35 „	1	1 „ 35 „	2	1 „ 18 „
August ...	0	—	—	—	—	—
September	0	—	—	—	—	—

Cyclones are not met with *near* the coasts treated of in this volume.

MALACCA STRAIT.—Although Malacca strait is within the limits of the north-east and south-west monsoons of the Indian ocean, yet on account of the high land on either side of the strait the winds are variable; but land and sea breezes are regular on both coasts. In the offing, the monsoons are only regular when they are at their height in the adjacent seas; even then, however, the wind is moderate in the strait and only lasts during a part of the day. The monsoons become more regular near Singapore.

South-west monsoon.—Between Acheh head and Junkseylon the south-west monsoon commences in the latter part of April or the early part of May, and ceases in October; in November there are calms and variables and westerly winds frequently prevail.

The south-west monsoon seldom blows far into the strait. In the middle of the strait during this season, variable winds, chiefly those from S.E. and S.W., prevail with long calms. On the Sumatra side

See the Admiralty Wind and Current atlas for the Pacific, Atlantic and Indian oceans.

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light winds and calms prevail, and heavy squalls from the land are experienced during the night. On the Malayan side there are fewer calms and seldom any squalls; variable winds or land and sea breezes are experienced.

During the south-west monsoon, the weather is generally cloudy and stormy, especially when the monsoon is at its height.

Sumatras, or squalls from the south-west, are more common during the south-west monsoon than in the north-east monsoon. They generally blow during the first part of the night, are sometimes sudden and severe, and are accompanied by thunder, lightning, and rain; they are more frequently met with on the north coast of Sumatra, and on the Malay coast between Parcelar hill and Karimon islands. Here they often blow for six or eight hours at a time as a strong or moderate gale.

North-westers are not so frequently felt as the Sumatras; they are most common during the south-west monsoon and occur in the north-western part of the strait between Acheh head and Aroa islands, but sometimes blow through as far as Singapore strait. These winds are sometimes severe at their commencement, but their strength soon abates. They are generally preceded by a black cloud arch which rises rapidly from the horizon towards the zenith, often allowing not more than sufficient time to reduce sail after its first appearance. They are sometimes accompanied by lightning, thunder, and heavy rain.

The North-east monsoon prevails in the western entrance of Malacca strait from November to April, which is the fair season, the weather being then more settled; there are seldom any hard squalls, and there is less thunder, lightning, and much less rain than in the other season.

In November the winds are variable, frequently from North-west and West, (extending from as far westward as Ceylon), although occasionally the north-east winds set in in November. From this period to March the north-east monsoon is strongest, but at times North-west and West winds of one or two days' duration have been experienced in every month when the north-east monsoon should prevail. Late in March the north-east and northerly winds become light and variable, with strong land breezes at night. On the Malayan side these breezes commence between 8 and 10 p.m., and

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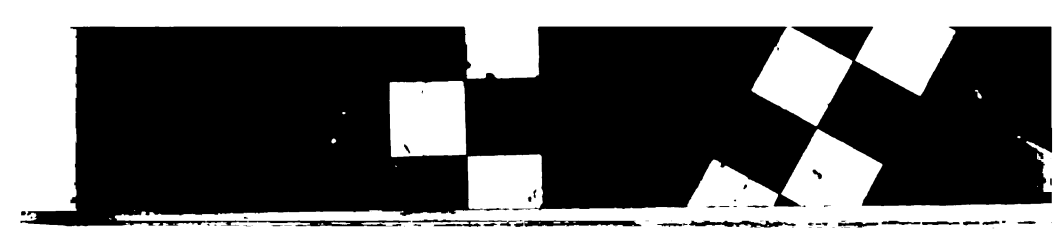

last four or five hours, sometimes all night; this is more generally the case between mount Formosa and cape Rachado. There is less calm on the Malayan than on the Sumatra side of the strait.

MALAY PENINSULA.—Singapore.—During January, February and March, the north-east monsoon period, the winds from N.E. to N.W. predominate, with frequent calms. April and May, the commencement of the south-west monsoon, the directions are principally from N.W., W.N.W. and West. In June, July and August, from S.W.; and from September to November variables (West to N.N.W.). The north-east monsoon sets in in December. The greatest velocity of the wind during the year under discussion (1890) was 193 miles in the 24 hours, on the 4th December.

Malacca.—N.N.E. and W.S.W. winds are prevalent during the first six months of the year. In the remaining months the winds are principally South, S.E., and N.W. The greatest velocity registered in 1890, in 24 hours was 178 miles, on the 26th December.

Province Wellesley.—North-west winds prevail during January and February, and south-west winds from March to May, and in the other months, S.S.W., N.N.E. and N.E. The greatest velocity in 24 hours (in 1890) was 175 miles, on the 4th February.

Penang.—The prevailing winds from January to June are N.E. and N.W. During the latter half of the year, north-west winds predominate. The greatest velocity in 24 hours (in 1890) was 255 miles, on the 29th March.

Junkseylon.—At Junkseylon, in the northern entrance to Malacca strait, the monsoons are more regular than at the Straits Settlements. The north-east monsoon sets in in December, with strong gales from N.E. to N.W., with lightning, and continues until March; this is the dry monsoon and much sickness prevails on shore between February and April. In March, the monsoon is weak with occasional squalls. April is the change, winds from West to North with heavy squalls. The burst of the south-west monsoon occurs early in May; it has fairly set in by June, and heavy squalls and rain are frequent. It continues, with many days rain and as many days fine, until October. November is variable with heavy squalls from all quarters. The maximum days rain per month (about 20) occur in August; in January and the early part of February there is little or no rain.

See the Admiralty Wind and Current atlas for the Pacific, Atlantic and Indian oceans.

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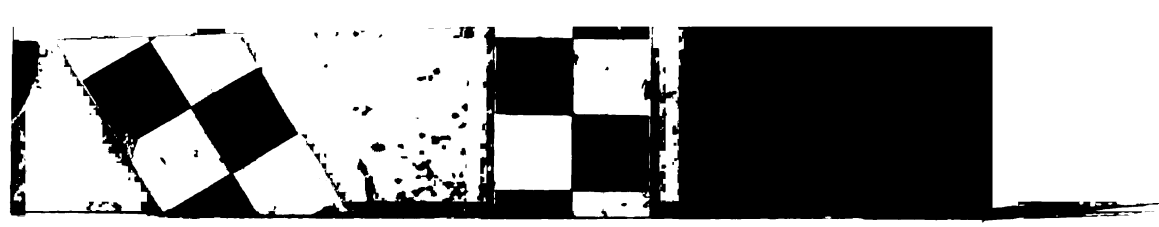

SUMATRA, north coast.—The south-west monsoon prevails from about April to November, and the north-east monsoon from about November to April as previously stated for Malacca strait. During the south-west monsoon, the wind frequently holds both day and night between Acheh head and Pedir point, whilst farther eastward it is not so permanent. In the strength of the north-east monsoon, the wind blows from East to N.E. from about 10 a.m. to 4 p.m., strengthening near the close ; it then begins to drop and is usually calm about sundown, and there is a land breeze during the night. In April, S.W. and West winds begin and the south-west monsoon is established in May. For Sumatras, *see* p. 20. Waterspouts are seen off this coast at times.

East coast.—The coast between Diamond point and Deli, is not so much under the influence of the prevailing monsoon, the direction of wind being completely altered by the conformation of the land, the broad plains at the foot of the high mountains being most favourable to the regularity of land and sea breezes. As a matter of fact, the wind is mainly N.E. by day and S.W. by night all the year round on the coast. Nevertheless, the influence of the north-east monsoon is not to be mistaken in the increased persistency of the north-east winds in January, February and March. North-west winds sometimes occur at night in February and March, but they are unfrequent compared with the winds from West and South-west.

Throughout the year, north-west and south-west winds are observed at uncertain periods for several days at a time and generally accompanied by fine weather. Sumatras are more frequent here than on the north coast.

West coast.—The influence of the south-west and north-east monsoons are felt on the west coast of Sumatra as far south as about lat. 2° N., southward of which the monsoons of the Indian ocean are experienced. But from Acheh head to lat. 4° N. the winds are quite different from those between 4° N. and 2° N.

Between Acheh head and lat. 4° N., the south-west monsoon prevails from May to October, inclusive, and the north-east monsoon from December to March. During the height of the south-west monsoon, the sea breeze prevails at times during the night, but generally speaking the land winds are clearly perceptible by the deflection of the wind to S.E. or North during the night. Squalls

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are frequent during the monsoon and there is often a considerable sea along this coast. It is somewhat hazy at times.

The north-east monsoon period is from December to March, and it is less strongly marked. When the monsoon has fairly set in, there is usually a gentle southerly breeze in the morning, followed by a calm, and in the afternoon a light sea breeze. After sunset comes the land wind which prevails all night.

Between lat. 4° N., and lat. 2° N., is the region of calms and light variable winds. From the Batavian meteorological records, calms occur more frequently here than in other portions of the Netherlands India possessions; squalls occur occasionally.

The influence of the monsoons only appears in a westerly tendency of the day wind from March to November, and an easterly tendency from November to March; at night, except in January and February, there is always a northerly tendency in the wind.

In April, S.W. and N.W. winds are most prevalent both night and day. From May the N.W. winds become more prominent. During the following months they increase and reach their maximum in October; at times these winds cause a considerable sea.

August is marked by a frequency of north-east winds. At night, the winds from May to November are from N.W. to N.E.

From November to January, the wind is very variable in the daytime, at night it is generally from N.E. to East. In February, the wind is often from S.E. to East, but there is also much westerly wind. At night, the winds are divided between S.W. and E.S.E., or S.E. winds. March is marked by a westerly wind by day, and N.E. or East winds at night.

Southward of the equator, in the offing, the winds gradually merge into those prevailing in Sunda strait and the Java sea. *See* p. 24.

At Padang (lat. 1° S.), when the south-east monsoon is well established in the Indian ocean, then it is noticeable in Padang; these winds, however, seldom prevail longer than a couple of hours, and are mostly light.

The prevalent winds are N.W. and West; in the months of February, March, and April, usually accompanied by fair weather; in May, June, and July, alternating from N.W. to S.W., with thunder and rain squalls.

In the months of August, up to and including December, the N.W. and West winds are generally well established, accompanied by hard squalls, outbursts from the north-west, a high sea from

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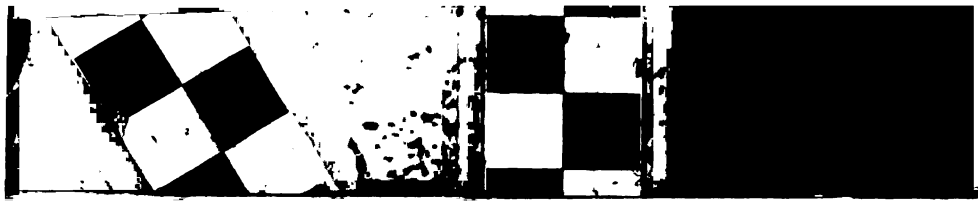

north-west to south-west, and much rain. The squalls usually come without warning, with violent gusts of wind. Day after day during the months mentioned the wind will sometimes blow stiffly from N.W. and West; in the month of January the wind is variable, but it is then mostly light and calm. There is usually a land wind at night. For rainfall, *see* p. 16.

South-east coast of Sumatra and Java sea.—The easterly or south-east monsoon begins in April, is at its greatest strength from June to August, and ends in October, when the winds become variable. The north-west or westerly monsoon commences early in November, is at its height from December to February, and ceases at the end of March, when it is succeeded by light winds, squalls and rain.

The **easterly monsoon** is only fairly established on the south-east coast of Sumatra within 20 miles of the shore, during the months of July, August, and September. Towards Sunda strait it begins earlier; here also strong south-westerly winds frequently occur, generally setting in at about sunset and continuing constant during the night.

Near the coast the monsoon does not blow with equal force; when it has blown for several days with a force between a strong breeze to a fresh gale, from E.N.E. to E.S.E., there generally follows several days of calm, which periods are more frequent towards Banka strait, where the wind is then mostly light from S.S.E. to S.S.W.

During this monsoon, the atmosphere is very hazy, especially near the horizon, but it sometimes clears up towards evening; with strong winds the haze increases and the water assumes a milky, light-blue colour, which phenomenon is here known as the Tongara Putih, or the white south-easter.

Should several days of calm succeed, the haze lessens, and there may succeed several days of clear atmosphere, especially in the northern portion, where heavy rain and thunder showers occasionally occur.

These winds blowing on shore cause a considerable swell, rendering anchorage uncomfortable, as the current running either north or south, causes vessels to ride broadside on.

Northward of lat. 4° S., there is no regular easterly monsoon; south-east and east winds are indeed prevalent from July to October, but they are too irregular to merit the title of monsoon.

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The **westerly monsoon** is well established in the month of December, and continues until April. This is the period of clear weather. The change is usually effected without any violent squalls or calms of long durations.

Until about mid-January the wind varies from S.S.W. to W.S.W., when it shifts more to the westward. The wind usually inclines to the north-eastward in the afternoon and blows for some hours.

Heavy thunder storms and rain-squalls with hard gales from S.W. to N.W. occur during this monsoon, and these are more frequent in proportion as Banka strait is approached. The air is then very clear, and the coast of Sumatra, which shows as a dark streak on the horizon, can be sighted at a distance of 20 miles from aloft. By day, easterly and north-easterly winds frequently blow, but towards evening the heavy squalls which during the afternoon have been gathering in the west, inevitably set in with violence and the westerly wind which follows continues to prevail with more or less force during the night and morning.

Change of monsoons.—From April to July and from October to December is the change of monsoons within 20 miles of the coast of Sumatra.

Near **Banka strait,** even during the period of the easterly monsoon, strong southerly winds with rain frequently occur. The weather is generally finest during the change from the westerly to the easterly monsoon (April and May); the frequent calms, however, render the weather very oppressive.

Banka, Gaspar and Carimata straits.—In Banka, Gaspar and Carimata straits the monsoons prevail as in the Java sea. But the times of the changes of these monsoons and their direction are somewhat irregular, and the south-east monsoon is subject to calms.

In Banka straits the winds follow the direction of the coast, though with slight variations from the influence of the land and sea breezes; the monsoon is felt as a fresh breeze when working against it.

In Gaspar and Carimata straits, as a rule, the settled weather of the south-east monsoon can be counted on from about the end of May; the wind then blows strongly between S.E. and S.S.E. until the

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Although it is clear overhead, the horizon very seldom clears during this season, and the land is difficult to distinguish; about mid-day is the least hazy.

In the beginning of October the character of the weather changes, light south-east and southerly winds are felt up to mid-day, and are succeeded by land breezes from across the marshes of the west coast of Borneo, and are found a considerable distance from the shore. Thunder storms, much rain and violent squalls from the westward, alternating with successive days of calm fair weather, usher in the north-west monsoon. Numerous waterspouts may be seen at the change of the monsoons, and also during the north-west monsoon period. From February, unsettled weather precedes the change of the monsoon, and squalls occur from the north-westward.

November, the first month of the north-west monsoon, is the first of the four months of maximum rain; the violent gales from the north-west which occur in this month generally commence with a blueish leaden appearance on the horizon, and a high sea gets up in the northern part of the straits.

December is the most boisterous month; in January there is generally a constant northerly wind, but in February it again becomes unsettled, with squalls from the north-west.

The peculiar haze which accompanies the south-east monsoon is sometimes seen during the north-west monsoon, and when seen some days of continuous north wind may almost certainly be reckoned on.

CURRENTS.—Sumatra north coast, and Malacca strait.—Westward of the Acheh islands, there is a current setting in a westerly direction, often attaining a rate of 1½ to 2 miles an hour and inclining northward or southward of West by the action of the prevailing monsoon. Between these islands and the Nicobars, during the strength even of the south-west monsoon there is frequently a current setting in the teeth of the monsoon at the rate of 2 miles an hour. At the same period, there is said to be a strong current between pulo Weh and lat. 6° 30′ N., setting eastward as far as the meridian of Diamond point; this current is said to continue all the year round, but with less strength during the north-east monsoon. It is to be regarded as a counter

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Through Malacca strait there is a constant north-westerly set, but near and southward of the Aroa islands where the strait is considerably narrowed, it is only felt by its action on the tidal streams, decreasing the velocity of the flood stream and almost overcoming it during neaps, and increasing that of the ebb to the same extent. In the north-west portion, the same effect is produced near the shore on the tidal streams, but out in the middle of the strait it is fairly constant and strongest during the north-east monsoon period; it finally makes its way seaward along the Pedir coast and affects the tidal streams there, as above mentioned. The tidal action is not appreciable beyond the distance of about 8 miles off the Pedir coast and about 40 miles off the east coast of Acheh, Langksa, &c.

Sumatra west coast.—The current on the west coast of Sumatra is mainly influenced by the prevailing wind, but occasionally it has been found to run against the wind. Taking the year round there are more and stronger currents running south-eastward than in the opposite direction, and they are more frequent in October, November, and December. The are usually weak and have never been found to exceed 2 miles an hour, and seldom exceeds one mile. Within 4 miles of the land there are weak tidal streams, the flood running north-westward and the ebb south-eastward.

To the northward of the equator, when the current is setting to the southward betwixt the coast and the islands, it is frequently at the same time running to the northward in the open sea, far outside of them.

To the southward of the equator, when at times the southerly winds blow with considerable strength from June to October, a drain of current is impelled to the northward. Observations are wanted in this portion.

Sunda strait.—There is a south-westerly current setting through Sunda strait nearly all the year round, but much affected by the prevailing wind; its effect on the tidal streams is to retard or overcome the north-easterly or flood stream and to increase the ebb.

In the Java sea the currents are for the most part influenced by the prevailing monsoon, and are generally stronger during the north-west than in the south-east monsoon. They incline to the northward or southward, according to the influence of the currents of Sunda, Banka, and Gaspar straits; for, during the north-east monsoon they run

See the Admiralty Wind and Current atlas for the Pacific, Atlantic and Indian oceans; also Current (monthly) charts.

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the eastward, or more southerly, according to the set of those ıich come from the straits; and in the south-east monsoon they ɜ to the westward or more northerly from a similar cause.

Banka strait is chiefly tidal, but greatly affected by the winds; ' details in the body of the work.

In Gaspar and Carimata straits the current depends greatly ı the strength of the wind. During the strength of either monsoon, e current, when accelerated by the tidal stream runs from 2 to knots per hour with the wind; when the monsoon is light and the lal stream is against the wind there is little or no current, and the dal stream at times overcomes it.

TIDES.—Throughout the Eastern seas, the rise and fall of the de is largely affected by diurnal inequality.

At **Singapore** and its neighbourhood the general feature of the des consists of one high and one low water, succeeded by a second igh and low water of considerably diminished range, the difference etween the heights of this inferior high and low water being educed sometimes to a few inches only; but the difference between wo successive low waters is generally greater than the difference etween two successive high waters. At certain of the moon's uadratures and in years of large lunar declination, this inferior tide ıay disappear altogether. At these times there will be only one high nd one low water during the day. Special tide tables are published Singapore. *See* also p. 216.

Sumatra.—On the west coast of Sumatra there is but little rise nd fall, and what there is does not seem to follow any known laws. n the lat. of pulo Raja (about 5° N.) 8 hours may be assumed as the me of high water at full and change, and the rise from 2 to 3 feet. t places near the equator the time is about 6 hours.

On the north and north-east coasts there is high and low ater twice during the 24 hours, and the highest tide occurs from to 3 days after full and change of the moon. A peculiarity about ıem is, that from about 1 to 2 days before until 5 to 6 days after ıll and change, the tide rises to within a few inches of the maximum t springs, so that there are about 15 days in the months in which ıe water rises to within a foot of its maximum. During the

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30 to 40 minutes per day; during neaps the change is sometimes more than 2 hours per day. From March to November the day tides are the highest, and during the remainder of the year the night tides are highest. South-east winds keep the tide back and north-west winds increase it in Malacca strait.

For other places and for tidal streams, *see* the body of the work.

Fishing stakes.—On most of the banks fronting the shores of Malacca strait, and probably off most of the coasts mentioned in this volume, particularly off the mouths of rivers, fishing stakes and enclosures will be met with in depths of 3 to 5 fathoms, and in some cases in greater depths. These enclosures, known as *seros* and *jermals*, are constructed of trees firmly driven into the banks, and interlaced with branches, &c., and form a considerable danger to vessels navigating at night near the depths mentioned. To those locally acquainted, however, these enclosures, which last many years, are good landmarks for making the river mouths, especially on the east coast of Sumatra, where there are but few objects of recognition.

PASSAGES.*

Full-Powered Steam Vessels.†

ADEN to PENANG and SINGAPORE.—Both monsoons.—The route is direct to Malacca strait, *viâ* Colombo, passing northward of Sokotra from April to October to avoid the heavy cross seas to the southward of it during the south-west monsoon period; thence on either side of Minikoi.

Malacca strait.—The navigation of Malacca strait is not dangerous; the channels are mostly spacious with good anchorages, but due attention to the set of the tidal streams and currents is requisite. Pulo Rondo, 426 feet high, or pulo Bras light, off Acheh head, visible in clear weather about 30 miles, should first be sighted; thence steering to pass between Ayer Jambu or Diamond point and pulo Pérak. (Pulo Pérak is an islet 394 feet high, steep-to, and lies directly in the fairway of vessels coming from the northward, and is often the first land seen by those entering the strait in the thick weather of the south-west monsoon period.) From pulo Pérak shape course for Penang, if bound there.

* *See* "Ocean Passages for the World," 1896, for full details.

† *See* chart, No. 1,077.

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But to proceed for Singapore, course should be steered for pulo rak, distant 125 miles, also high and steep-to; thence to pass mid-ay between Aroa islands, and North Sands and One-fathom bank, further distance of about 65 miles. Having passed One-fathom nk, vessels should approach the coast in the vicinity of Parcelar ll to a distance of 6 or 7 miles, in depths of 17 to 20 fathoms. hen abreast of the hill steer to pass 5 miles outside cape Rachado, hich in the distance appears like an island. Cape Rachado light is sible 26 miles, and should be approached between the bearings of . ½ S. and S.E. by E. ½ E. From abreast cape Rachado steer to pass or 5 miles outside pulo Undan light, visible 20 miles, on the outer ater island, and in soundings of 20 to 26 fathoms; this course will ad 7 miles north-eastward of Raleigh shoal, and about 10 miles rth-eastward of Rob Roy bank. From Water islands steer to pass etween Long and Fair channel banks; pulo Undan light will arcely be lost sight of in clear weather before pulo Pisang light is ghted; thence 5 miles outside pulo Pisang light and through ingapore strait, passing between Sultan shoal lighthouse and Tree land. *Continued at* p. 205.

SINGAPORE and PENANG to ADEN.—Both monsoons.—*Viâ* Malacca strait, reversing the directions given above, den to Singapore. Those wishing to avoid much wear and tear ight take the route recommended for a vessel with sail and uxiliary steam power *viâ* Sunda strait, observing, however, that ne distance is increased by about one thousand miles.

ADEN to SUNDA STRAIT.—South-west monsoon.—*Viâ* Colombo, passing close northward of Sokotra, and on either side f Minikoi. Thence direct to Sunda strait, sighting Engano island.

Or, as in north-east monsoon.

North-east monsoon.—Close around Ras Asir, direct between ne Maldives and Chagos groups (One-and-a-half Degree channel), nence direct to Sunda strait, sighting Engano island.

SUNDA STRAIT to ADEN.—Both monsoons.—The reerse of the outward route, namely, *viâ* One-and-a-half Degree hannel. An alternative route for the north-east monsoon period is *viâ* Colombo.

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SUNDA STRAIT to CHINA SEA.—Both monsoons.—*Viâ* Banka, Gaspar or Carimata straits; return by same routes.

SUNDA STRAIT to KING GEORGE'S SOUND.—Direct for cape Leeuwin.

SINGAPORE to CHINA.—*See* China Sea Directory, Vol. II.

SINGAPORE to BATAVIA.—Both monsoons.—*Viâ* Rhio and Banka straits. *See* remarks on these straits, pp. 38, 39.

BATAVIA to SINGAPORE.—*Viâ* Banka and Rhio straits.

CAPE OF GOOD HOPE to SUNDA STRAIT.—All seasons.—From the Cape keep along shore out of the strength of the Agulhas current, avoiding all salient points, particularly the neighbourhood of cape Agulhas, until abreast Algoa bay, thence nearly the great circle route, crossing the meridian of 40° E. in lat. 33° S., and of 80° E. in lat. 20° S., thence direct for Sunda strait northward of Keeling islands.

SUNDA STRAIT to CAPE.—Pass northward of Keeling islands, crossing the meridian of 80° E. in about lat. 18° S.; thence passing about 300 miles southward of Mauritius, and 120 miles southward of Madagascar, to the African coast near Natal, thence within 50 to 100 miles of the shore in the strength of the Agulhas current; it is advisable to sight cape Agulhas, but to give it a wide berth.

Sunda strait to ports eastward of Batavia, *see* Eastern Archipelago, Part II.

Vessels with Sail and Auxiliary Steam Power.*

ADEN to PENANG and SINGAPORE.—South-west monsoon.—Northward of Sokotra and Minikoi to Colombo. Thence to Malacca strait and as for full-powered vessels to Singapore, p. 29.

North-east monsoon.—Close along the Arabian coast as far as Ras Fartak (about 53° E.), thence on either side of Minikoi direct for Colombo. From Colombo, as for full-powered vessels, *viâ* Malacca strait, p. 29.

* *See* "Ocean Passages for the World," and chart, No. 1,078.

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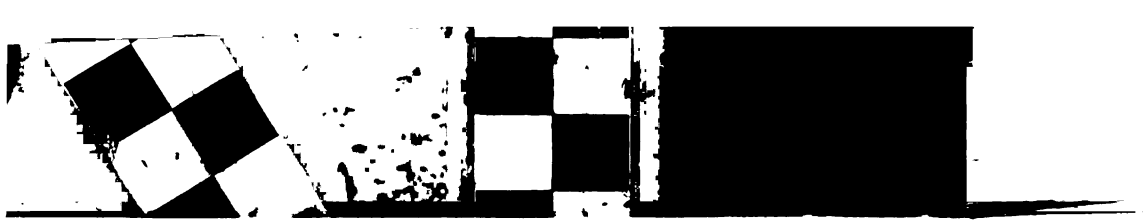

SINGAPORE to ADEN.—South-west monsoon.—During he strength of the monsoon, the route is *viâ* Rhio, Banka, and unda straits. Thence southward of Diego Garcia, north-east-vard of the Seychelles and for Ras Asir.

For Colombo, from about 90° E., steer north-westward to cross the quator in the meridian of that place, thence direct.

When the south-west monsoon is moderate, if bound either to den or Colombo from Singapore, and more especially from Penang, Malacca strait route may be taken (pp. 29, 30) to Acheh head ; thence teer to the south-westward under fore and aft sails, and into the outh-east trade to 4° to 6° S., when proceed as above.

North-east monsoon.—*Viâ* Malacca strait to Acheh head, hence direct to Colombo, on either side of Minikoi and north-vard of Sokotra to Aden. *See* remarks on navigation of Malacca trait, for vessels from Aden to Singapore, pp. 29, 30 ; these reversed nay prove useful.

SINGAPORE to SUNDA STRAIT or BATAVIA.—*Viâ* Rhio and Banka straits. *See* remarks on these straits, p. 38.

SUNDA STRAIT or BATAVIA to SINGAPORE.—Both monsoons.—*Viâ* Banka and Rhio straits.

CAPE OF GOOD HOPE to SUNDA.—April—October. —Stand southward from the Cape to lat. 38° to 40° S., thence between hose parallels southward of St. Paul to 80° E., thence north-eastward o cross the meridian of 100° E. in lat. 30° S. ; pass close westward of Christmas island across the easterly monsoon to Sunda strait, making for Java head.

Care should be taken, especially in June, July and August when he easterly monsoon and the westerly current are strongest, to keep vell to the eastward when approaching Java head.

October to April.—As above as far as 80° E., whence course hould be shaped to cross the meridian of 95° E. in lat. 30° S. Thence ass about midway between the Keeling and Christmas islands vith the westerly monsoon, sighting Flat cape, on the west side of the trait ; as the westerly winds blow with considerable violence at imes, and combined with the strong easterly current, would render t a matter of considerable difficulty for a vessel with small power, or a sailing vessel to beat to windward, should she get to leeward of he strait.

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SUNDA STRAIT to CAPE OF GOOD HOPE.—April—October.—Direct and on either side of Rodriguez island, 100 miles southward of Mauritius and Madagascar to the African coast near Natal, thence in the strength of the Agulhas current (from 50 to 100 miles off shore) for the Cape, sighting cape Agulhas, but giving it a wide berth.

October—April.—Pass close southward of the Keeling islands on the starboard tack with the westerly monsoon into the south-east trade, thence crossing the meridian of 80° E. in lat. 30° S.; thence about 300 miles southward of Mauritius, 100 miles southward of Madagascar, and as above for the Cape. It must be remembered that this is the cyclone season, and weather signs should be carefully attended to.

Sunda strait and Western Australia.—*See* Australia Directory, Vol. III.

Sailing Vessels.

SINGAPORE to ADEN and COLOMBO.—South-west monsoon.—Southward through Rhio and Banka straits to Sunda strait, the route for vessels with sail and auxiliary steam power, during the strength of the monsoon; *see* p. 32.

If bound from Penang to Colombo, a vessel should make for Diamond point, whence the north coast of Sumatra should be kept in order to benefit by the westerly current adjacent to it. Thence through Bengal passage, keeping near the north-east side of pulo Bras. From a good berth off Acheh islands, vessels must stand southward across the monsoon into the south-east trade, thence as from Singapore in a small powered steam vessel; p. 32.

North-east monsoon.—Through Malacca strait to Acheh head, thence direct to Colombo, and as for small powered steam vessels, p. 32. If bound to Point de Galle, the land should be made to the northward of the Little Basses.

If bound to Madras, or other part of the Coromandel coast, vessels should keep the Malay coast and its adjacent islands until Salang or Junkseylon island is reached, which may be rounded at a convenient distance. Thence, if early in the season, a course should be steered to pass through Ten-degree channel, between Car-Nicobar

See "Ocean Passages for the World," and chart, No. 1,078.

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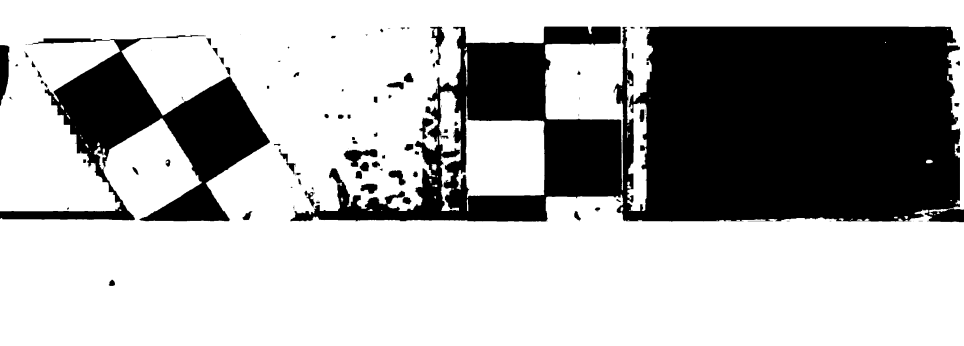

and Little Andaman islands, or the Sombrero channel may be chosen at discretion if not bound to the northward of Madras. In December and January care must be taken to make the land a little to the northward of the intended port.

At this season vessels usually experience favourable weather and fair winds in Malacca strait. *See* remarks for proceeding in opposite direction, below, Colombo to Singapore, which reversed, will apply. Towards the end of the monsoon, after mid-March, vessels should pass southward of Sokotra.

COLOMBO to SINGAPORE.—Both monsoons.—*Viâ* Malacca strait.

The navigation of Malacca strait is, with ordinary caution, not dangerous, the channels are mostly spacious and have good anchorage, but due attention to the set of the currents and tidal streams is requisite. The sailing passage is much facilitated by keeping under way at night, for steady breezes then often prevail, calms and faint airs being experienced during the day ; passages are thus made without anchoring more than once or twice. The passage to the north-west is generally made in less time than the one to the south-east, there being usually a constant current in that direction. Vessels which sail well, will, by taking every advantage of the favourable shifts of wind, gain ground during neaps against the ebb tide, or current, with a moderate working wind, except in the narrow parts, where the stream runs strong. A stream anchor ready for tidal use will be found convenient in most parts of the strait.

South-west monsoon.—Sailing vessels from Colombo during the south-west monsoon should steer so as to pass between pulo Rondo and the south end of Great Nicobar island, carefully taking every opportunity of verifying their position, as the currents during this season are strong and uncertain. Vessels set to the southward, which is not an uncommon occurrence when there is much westing in the monsoon, may pass between the Acheh islands ; but with a steady and commanding breeze Bengal passage is the best.

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Vessels bound to Acheh in this season should make Acheh head,

When to the eastward of pulo Weh the monsoon will most likely fail, but vessels should endeavour, by the aid of the variable winds, to sight pulo Butang and then keep on the Malayan side of the channel, where a tidal influence prevails, and where there is less calm, but generally variable winds, or land and sea breezes. Sometimes a brisk westerly wind will be carried as far as Penang. When once the islands on the Malay coast are sighted there will be no difficulty in getting to the south-eastward.

In the entrance of Malacca strait near the Nicobar and Acheh islands, and between them and Junkseylon, there are often strong and noisy ripplings, particularly in the south-west monsoon. These ripplings occur when there is no perceptible current, and in calm weather are seen approaching from a considerable distance; in the night their noise gives warning of their approach; the spray sometimes breaks on a vessel's deck.

After passing from 10 to 20 miles westward of pulo Butang, and not being bound to Penang, a course should be steered to pass nearly midway between the Sembílan islands and pulo Jarak. With a working wind the west side of Penang may be approached to depths of 10 or 12 fathoms; Great Kra flat and the bank which skirts the coast to pulo Dinding, and extends seawards 10 or 12 miles, may be approached to the same depths, guarding against the indraught of the rivers on the flood tide when near the bank. Under 15 fathoms the water shoals rapidly to the edge of the bank. Sembílan island and pulo Jarak have deep water within a short distance, and may be seen from a distance of 20 miles. In this track the depths are from 28 to 34 fathoms.

After passing the Sembílan islands vessels should make for the North Sands and steer a course to pass 5 or 6 miles to the westward of the north extreme; the depths will then decrease from 28 or 30 fathoms to 10 or 15 fathoms. In this depth during daylight, Aroa islands will probably be sighted. Round Aroa island, having trees on its summit, may be seen a distance of 15 miles, when, guided by the bearing of these islands and the soundings, the vessel may pass along the west side of the North Sands until One-fathom bank lighthouse be sighted, when course should be shaped to pass 2 miles westward of it. *See* p. 184.

When the winds incline from East or E.S.E. keep near the Malay coast in from 20 to 30 fathoms, until 25 or 30 miles past the Sembílan islands, then steer more southerly to get soundings of 16 or 18 fathoms

See "Ocean Passages for the World," and chart, No. 1,078.

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on the north-west edge of North Sands; keep in these soundings, rounding the edge to the south-west until Aroa islands and Parcelar hill are sighted; from the masthead both may be seen when on the north-west edge of North Sands.

Working to the eastward in the north-west part of Malacca strait requires no special directions, (beyond those referred to in the sailing passage during south-west monsoon, *namely*, to make for the Malay coast and work along it), the strait being wide and clear, until the North Sands and Aroa islands are approached, and which are situated about 130 miles southward of Penang. When approaching the North Sands it is advisable to keep near their western edge, making short tacks and approaching the Sands to 10 or 11 fathoms. One-fathom bank light, which is visible 13 miles, may be brought to bear as far southward as S.E. by S., until within a distance of 4 miles, when this bearing is no longer available, as One-fathom bank with its outlying shallows extends 3½ miles north-west of the light. By keeping near the edge of the Sands more moderate depths will be found for anchoring.

In this portion of the strait and also farther south-eastward the tidal streams at springs run with some strength, the south-east stream running from 2 to 3 hours before until 2 to 3 hours after high-water at One-fathom bank; *see* p. 183. During neaps the tides are weak and irregular, and the prevailing north-westerly current is more appreciable. Caution is requisite in navigating this part.

When to the south-eastward of One-fathom bank, vessels should stand over to the Malay coast, which in the neighbourhood of Parcelar hill may be approached to one or two miles, guarding against the indraught to Klang strait on the ebb; thence working down the coast and not standing farther off than 10 miles in order to give a berth to South Sands, which are steep-to. North-eastward of Bambek shoal the shore may also be approached to one or two miles. Cape Rachado light, kept between the bearings of S.E. by E. ½ E. and E. ½ S. will lead clear of Bambek and Pyramid shoals.

After passing Water island and Rob Roy bank there may be said to be no danger in the channel until Formosa bank is approached; bearings of pulo Undan or pulo Písang lights will in clear weather be of some guide in avoiding it. Vessels may stand safely over

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of approach to the mud-flat skirting the Malay coast. Pulo Bengkalis is low and wooded, and near Tanjong Parit, its north-east point, may be approached to 4 or 5 miles, the lead being here also a sufficient guide when to tack.

Abreast Long bank the channel for large vessels is narrowed to 11 miles. If pulo Pisang be seen, keep it between the bearings of E. by S. and S.E by E. ½ E. In standing towards the Malay coast, the soundings on Fair-channel bank are a good guide, and on a nearer approach to pulo Pisang, vessels may, guided by the depths on the ridges, stand farther over towards the Sumatra shore. From pulo Pisang to Tanjong Bulus the channel is comparatively clear, and either side may be safely approached, taking care to avoid the spit extending 5 miles south-east of pulo Pisang, which is steep-to. The mudbank between pulo Kokob and Tanjong Bulus, entrance to Singapore strait, is also steep-to, and the shore should not be approached within 2½ miles, or to a less depth than 17 fathoms.

North-east monsoon.—Sailing vessels from Colombo are recommended to pass close to the south end of Great Nicobar island if the wind permit. Those from Madras should pass through Sombrero channel (Nicobar islands). When within the strait they should endeavour to get near the Malay coast as soon as possible where there are tidal streams and more favourable winds. If necessary to work through, proceed as before directed. Those from the southward should not make the land southward of Acheh head as there is considerable difficulty in working up along shore against the wind and current; vessels here at times have to stand out to sea again to make sufficient northing. Westward of the islands there is a constant westerly set of 1½ to 2 miles an hour, but close northward of them there is said to an easterly set. *See* p. 26.

SINGAPORE to HONG KONG. *See* China Sea Directory, Vol. II.

SINGAPORE to SUNDA STRAIT and BATAVIA.—Both monsoons.—*Viâ* Rhio and Banka straits.

SUNDA STRAIT and BATAVIA to SINGAPORE.—Both monsoons.—*Viâ* Banka and Rhio straits. *See* remarks on these straits, p. 38.

See "Ocean Passages for the World," and chart, No. 1,078.

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When the north-east monsoon is at its strength, vessels may proceed through Berhala and Durian straits to Singapore, instead of beating about outside against a heavy sea, and an adverse current to Rhio strait. This, however, is a tedious passage and a vessel has been known to take 30 days from Sunda strait to Singapore, a distance of only 500 miles. *See* also the following remarks on the passage from the Cape to Singapore.

CAPE OF GOOD HOPE to SUNDA STRAIT and CHINA SEA.—General Remarks.—At all seasons of the year it is usual for vessels bound from Europe to Batavia, Singapore, and ports as far northward as Saigon, after rounding the Cape of Good Hope to steer as directed for vessels with sail and auxiliary steam power, at page 32, for Java head, and to pass through Sunda strait into the Java sea. Thence for Singapore, by Banka and Rhio straits, as above stated; and for the China sea by either Banka, Gaspar, or Carimata straits.

The route by Sunda strait and the China sea is also the direct and ordinary one for vessels bound to China and Manila; except for those which pass St. Paul's island between the middle of September and the middle of January, when the more eastern routes are recommended, for which *see* Eastern Archipelago, Part II.

Banka strait being fairly lighted and buoyed is without doubt the best and safest route into the China sea; it is easy of approach, and affords convenient anchorage in every part, which enables vessels to avail themselves of favourable winds and tidal streams; it has in fact become the recognised highway of the trade passing between Sunda strait to Batavia and Singapore. *See* Rhio strait, p. 39.

Gaspar strait, on the contrary, is somewhat dangerous of approach; rocks and shoals extending for 35 miles to the southward, the depths of water are too great to afford convenient anchorage, and it conducts into a part of the China sea, containing many dangers, amongst which vessels are liable to be set by uncertain currents. But for vessels bound to China, Gaspar strait being shorter and more direct, is still preferred, and will no doubt continue to be by many navigators, especially those who are anxious to make quick passages, even at the expense of incurring additional risk. It is certain that a vessel

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advantage in point of time by passing through the latter; but in calms and light airs, or against the north-east monsoon, there is good reason to believe that vessels will make quick, and often quicker passages, by proceeding through Banka strait, and they will always be assured of much greater safety. For northward of Gaspar strait, *see* Vol. II.

Rhio strait is the one generally followed by all vessels proceeding from Banka strait to Singapore, being safe, sheltered and easily navigable, the Netherlands Government having lighted and buoyed the principal dangers. Whereas, the route outside or eastward of Bintang is exposed in both monsoons, and there are many outlying dangers, which render it necessary for vessels to keep at a considerable distance from the land.

Berhala strait has been referred to on p. 38, first paragraph.

CHINA SEA to SUNDA STRAIT.—North-east monsoon.—Between the Anamba and Natuna islands, and through Banka or Gaspar strait to Sunda strait.

SUNDA STRAIT to CAPE OF GOOD HOPE.—April—October.—As for vessels with sail and auxiliary steam power, p. 33

October—April.—As for vessels with sail and auxiliary steam power, p. 33.

See chart, No. 1,078.

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CHAPTER II.

MALACCA STRAIT AND ITS NORTHERN APPROACH.—SUMATRA OR WESTERN SHORE.

VARIATION in 1896.

Malacca strait - - - - 2½° E.

General Remarks, on the winds, weather, current, &c., in Malacca strait will be found in chapter I.; directions for navigating it will be found under Passages, in the same chapter.

ISLANDS OFF NORTH COAST OF SUMATRA.*—PULO RONDO, or Tepurong, is the northernmost of the islands lying off Acheh head, the north-west point of Sumatra, the west side of the northern approach to Malacca strait. The island is 426 feet high, dark coloured, 2½ cables in length, steep-to on its north side, and about 30 miles off shore; rocky islets from 75 to 150 feet high, extend to the distance of one mile from its south side.

There are depths of about 100 fathoms at a short distance from the island and rocks.

There is temporary anchorage on the west side in 8 fathoms, with the extremes of the island bearing E. by S. and N.E. ¼ N.; but the heavy surf here renders it dangerous to anchor or land at times.

PULO BRAS or LAMPUJANG, situated about 20 miles southward of pulo Rondo, is the westernmost of the islands off Acheh head; it is 8½ miles in length, in a north-west and south-east direction, 6 miles in breadth at its south end, and attains a height in mount Chumo of 2,296 feet.

The coast for the most part rises steep and craggy from the sea, but in a few places ledges and rocks extend as much as a quarter of a mile off shore.

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Inhabitants.—On the south side, where there is a comparatively

sugar plantations. In the north-west portion there are small pepper plantations. The population is sparse, the villages having each an adult male population of 20 to 40.

Off the north end of pulo Bras are four rocky islets; North-west islet, the northernmost, is 25 feet high and about 4¼ miles distant, with depths of 25 to 30 fathoms within one mile. The other islets lie within one mile of pulo Bras, and the sea breaks heavily on them even in moderate weather. There is a passage between the North-west islet and the inner islets, but vessels are recommended to pass outside them all.

Depths of 15 to 20 fathoms, sand, will be found within about one mile of pulo Bras, where vessels may find temporary anchorage during fine weather, but the bottom is bad in most places, being chiefly coral or rock. In the bays the bottom is chiefly sand.

Fleurs rock, a small rock having a depth of about 6 feet, lies about 1¾ miles from the west point of pulo Bras, and nearly in line with two small rocks above water off the north point of that island. The westernmost of these lies with the north-west point of pulo Bras bearing E. by S. ½ S. about one mile, and the other with the point S.W. by S. the same distance. A sunken rock lies 3 cables off the point, and another about the same distance off shore westward of the lighthouse. The water in the vicinity of Fleurs rock is discoloured, and breaks when there is any wind.

LIGHTS.—At Willemstoren the north-east point of pulo Bras stands a circular tower, 147 feet high, painted white to a height of 98 feet and red the remainder, from which is exhibited at an elevation of 525 feet above high water, a *revolving white* light which attains its greatest brilliancy *every minute;* the light is visible between the bearings of N. 82° E. (through south and west) and N. 50° W., and in clear weather should be seen from a distance of 30 miles; within a distance of 12 miles a faint continuous light is seen. North-eastward of pulo Weh the light is obscured by that island.

From the same tower, at a height of 26 feet above the ground and 433 feet above the sea, is exhibited a *fixed red* light visible between the bearings of S. 15° E. and N. 82° E., over North-west islet; the light is intended to warn vessels of their approach to this islet, and in clear weather is visible from a distance of 8 miles.

See chart, No. 219.

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Lambaleh bay, on the north-east side of pulo Bras, is about ½ miles across between its entrance points, with from 19 to 20 fathoms ater on a line joining them, thence shoaling gradually to the hore.*

Pier.—About half a mile within the north point of entrance is sandy beach where a pier has been built for loading and dis-harging small trading craft. Some buildings remain of a former Dutch settlement.

Anchorage.—There is good anchorage during the south-westerly nonsoon, and though squalls from the hills are violent at times, the ater is smooth. There is considerable sea here during the north-st monsoon, rendering it advisable to have two anchors down.

Steam vessels usually anchor in 7 fathoms under Ujong Punir, ith the north extreme of pulo Weh in line with it. Sailing vessels nchor in 10 fathoms with Ujong Punir in line with Rondo.

A strong current runs northward past Ujong Punir; this point is recipitous with a depth of 20 fathoms close-to.

Balken and Sand bays† are situated on the west side of ulo Nasi, being only separated by a high point. Both bays afford nchorage during the north-east monsoon period, in 8 to 9 fathoms, ne sand.

Sidom or Pijlmer islets are two rocks lying close together on the orth side of entrance to Balken bay; close south-westward of them e two sunken rocks on which the sea breaks. Merdock peak, a onspicuous dome-shaped peak, in pulo Weh, seen through the valley ehind Sand bay (the southern part of Balken bay), bearing N. 76° E., ads into Balken bay, 2 cables southward of these dangers.

Lambaru bay, southward of Balken bay, affords anchorage in to 8 fathoms, during the north-east monsoon, to within about a ble of the shore. A good position, in 9 fathoms, is with the north-est point of the bay W.N.W. and the south point S. by W. These ays are not available during the south-west monsoon period.

Pulo U, a rocky islet off the north point of the bay has a rock out two cables north-west of it on which the sea always breaks.

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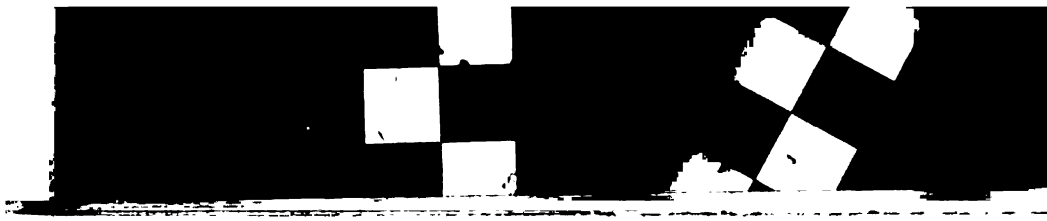
* See plan of Lambaleh bay on chart, No. 319.



Kwala Seranbuang is the mouth of the small stream on the south side of pulo Bras, where also is the village of Oleh Paja ; there is a reef in its mouth.

Pulo Nasi Kechil (Keresik) lies about three-quarters of a mile off the south-west end of pulo Bras ; it is about 2 miles in length, lofty and overgrown with brushwood, and there is a small village on its north-east side. The north coast is high and rocky, but the south and east is a sandy beach. A sandbank dry at low water extends halt a mile off the north-east point. Just northward of the west extreme is a rock a few feet under water.

Arus Keresik, the passage between pulo Nasi and Nasi Kechil has a fairway depth of 6 to 14 fathoms over half a mile in width.

Pulo Gepon is a barren rock half a mile southward of Nasi Kechil ; a semicircular reef with rocks above water and steep-to, extends about 8 cables southward of it.

PULO NASI BESAR* or Dedap nearly joins the south-east point of pulo Bras, being separated by Arus Lampujang, a rocky channel one cable wide with a depth of 12 fathoms, in which the tidal streams run with considerable strength ; a reef projects 1¼ cables south-west of the northern point of entrance.

Pulo Nasi Besar is triangular in shape, and about 4 miles in length and breadth.

The coast line is rocky in places, and in others, chiefly on the west side, there are sandy beaches. The water is fairly deep all round, the five-fathoms line being within 3 cables of the coast. There is an isolated rock in Rots bay, and two in Cedar passage southward of the island, hereafter mentioned.

Inhabitants.—The island is fairly thickly populated, the inhabitants being for the most part engaged in the cultivation of pepper.

Anchorages.—There is temporary anchorage in 6 to 10 fathoms in the bay on the south side of pulo Nasi about 1¼ miles eastward of the south-west point. Fresh water and firewood may be procured on the west side of the bay.

Also, on the west side, during the north-east monsoon period, there

* *See* plan of Cedar and Surat passages on chart, No. 2,760, also chart, No. 219.

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good anchorage in 7 to 8 fathoms, fine sand, in Pasijaning bay. is not available during the south-west monsoon.

Rots bay or Telok Jamir Kechil,* on the north-east side of ulo Nasi, is about 6 cables wide at the entrance and 4 cables deep, ith a shallow rocky patch 2 cables off shore near its head. Off ie south point of the bay is Rots islet, 187 feet high, one cable in xtent, round and thickly overgrown. W.N.W. of the islet and alf way to the shore is a rock with 3 feet water over it. During the outh-west monsoon, there is good anchorage in 6 fathoms at 3 cables om the shore, northward of the islet.

Pulo Kelapa or **Bunta**, about 2 miles in length, lies between edar and Surat passages. It is covered nearly to the summit with asuarina trees and it has a beach of white sand; rocky ridges with ocks above water extend both east and west of it.

The reef between Kelapa and pulo Batu has not less than fathoms over it. A rock above water lies one cable off the east xtreme of Kelapa.

Pulo Batu is a long and narrow island eastward of pulo Kelapa. s north side rises almost perpendicularly from the water, with a epth of 20 fathoms close-to; on its south side there is a sandy each, with temporary anchorage in about 10 fathoms off it. A ock above water lies off the west extreme of the island. Its east xtreme is connected with pulo Angkasa by a reef of rocks.

Pulo Angkasa is separated from the main by a channel 1¾ cables ide, with deep water, *see* Surat passage, p. 45.

CEDAR PASSAGE† (**Sawang Arus Besar**) is formed etween pulo Nasi Besar on the north and pulo Kelapa and pulo atu on the south, just described.

Dangers.—Batu point, the high and cliffy south-west extreme of asi Besar, lies on the north-west side of entrance to Cedar passage. t 4 cables south of the point is a sunken rock, and at one mile eyond, in a S. by W. ½ W. direction from it, is a rock nearly dry at w water. Between these rocks there is a depth of 19 fathoms, and

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Eastward of these, in the fairway of the passage at about 6 cables southward of the coast of Nasi Besar is a rock which just dries at low water, with depths around it of 6 to 7 fathoms.

These rocks are usually marked by breakers.

A reef extends about a quarter of a mile southward of the east point of Nasi Besar. The bank between Kelapa and Batu is out of the track and has been referred to with those islands.

Directions.—The channel recommended is that southward of the rocks lying near the fairway; it is about one mile wide at its narrowest part, with from 15 to 20 fathoms water.

Cedar passage is much wider than Surat passage, more free from eddies, and safer for a sailing vessel with a foul wind, as she can drift with a favourable stream under sail, taking care to avoid the fairway rocks before mentioned, and which are usually marked by breakers. The north side of pulo Batu is steep-to, and may be kept aboard. Both these passages are subject to frequent calms, rendering Bengal passage in which the wind is constant preferable to either.

Anchorage.—Tides.—It is high water full and change at about 9 hours; the flood setting eastward from about low water to about high water, and the ebb westward, at the rate of 3½ to 4 miles and 4½ to 5 knots an hour, respectively. The ebb runs usually longer than the flood, and there is but little slack. At neaps, and also during the north-east monsoon period there is little or no flood stream, but generally a strong westerly current made up by the prevailing westerly current combined with the ebb stream. At these times sailing vessels should enter by the Bengal passage. Anchorage may be taken on the bank of 4½ fathoms between pulo Kelapa and pulo Batu.

Tide rips appearing almost like breakers at times are met with in Cedar and Surat passages and northward of the Acheh islands; they are most violent during the south-west monsoon period, during the ebb tide; in the north-east monsoon they are heaviest during the flood tide, but nothing in comparison with the other season. They are somewhat dangerous to small vessels at anchor in the passages, at times.

SURAT PASSAGE (Sawang Arus Kechil*) is formed by pulo Kelapa, Batu, and Angkasa on the north-west, and the promontory of Acheh on the south-east. Between pulo Angkasa

* *See* plan of Cedar and Surat passages on chart, No. 2,760.

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nd Acheh head at the eastern end, the passage is only 150 yards ide, but the water is deep. Between pulo Kelapa and Sumatra e passage is 1½ miles wide with 12 to 17 fathoms water, and there e no dangers in it.

Directions.—Surat passage may be used by short steam vessels ith not less than 8 knots speed, but it is not recommended for iling vessels, as it is much subject to calms, rendering skilful andling of them imperative in the presence of such strong tidal reams. If used by sailing vessels, they should keep nearer to cheh head than to the opposite side of the channel, as Acheh head bold, with regular depths of 12 to 14 fathoms, sand, at a moderate stance. The south side of pulo Kelapa is also safe to approach, here being from 12 to 15 fathoms within half a mile of its south oint. If the tidal stream be unfavourable a sailing vessel must nchor until the flood stream makes. The flood sets north-eastward irectly through the passage, and the ebb in the opposite direction, the rate of 5 to 6 miles an hour at springs in the narrowest part of he passage, abreast Angkasa; the eddies caused by the rapid streams nder steering in this part difficult, if not dangerous, for sailing essels during light winds. An eddy prevails under Angkasa, which ombined with the stream coming between Kelapa and Batu causes a nfused sea, sometimes assuming the character of whirlpools. *See lso* tides, p. 45.

BENGAL PASSAGE, or Sawang pulo Weh, formed etween pulo Bras and pulo Weh, is about 11 miles wide and very eep, but it is the best approach to Malacca strait from the westward r sailing vessels. The winds are always S.W. or N.E. and fairly eady, whilst in the Cedar and Surat passages the winds are light nd variable, and the length of time occupied on the passage through hem depends more on the tidal streams and uncertain currents han the winds.

There is generally a current to the north-westward of one to miles an hour through the fairway of Bengal passage; vessels hould, if working in, keep near pulo Bras and Nasi Besar, where he streams are tidal, and where also anchorage may be taken if ecessary until the flood or south-east stream makes. *See* tides, p. 45.

It is the best passage at all times when proceeding westward.

The Berduri rock, which dries 5 feet, situated off the south end

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shore between Temanjung and Jum, on the west coast of pulo Weh, are the only dangers, but they do not lie near the fairway.

PULO WEH, the north-easternmost and largest of the islands off Acheh head, is separated from the Sumatra coast by Malacca passage, about 9 miles wide. The island is about 11 miles in length, from 2 to 6 miles in breadth, mountainous, and covered with luxuriant vegetation. The highest peak is the Lemoh Mati, 2,395 feet in height, and may be seen in clear weather from a distance of 36 miles. The east and west coasts are fairly straight and steep-to almost everywhere, affording but little anchorage.

The north and south coasts are deeply indented, forming Sabang and Peria Laut bays, and Balahan bay. Two miles off shore the depths are above 100 fathoms.

Small villages lie scattered over the island, which is thinly populated. The chief means of subsistence is pepper growing and fishing. Sulphur is found in considerable quantities, the nearest sulphur spring being situated about two hours' walk from Balahan village. There is a small lake named Anak Laut in the north-east portion; here and also in Balahan bay are several streams of fresh water.

West coast.—Ujong Bahu, the north-west extreme of pulo Weh, is easily recognised, the mountain side here falling steeply to the sea; it is surrounded by masses of rock which have fallen away from above, beyond which it is steep-to. Thence the whole west coast is cliffy excepting the sandy bay between Jum and Uhoh, and there are no dangers other than the sunken rock said to lie 3 cables off shore between Temanjung and Jum, referred to above.

In the sandy bay mentioned there is good anchorage during the north-east monsoon in 10 to 12 fathoms; and to the southward between Arroon and Berduri, off the village of Paja, there is anchorage in 10 fathoms.

South coast.—Berduri rock is a small rock that dries 5 feet at low water spring tides, at the distance of 6 cables southward of Berduri, the south end of pulo Weh. At 1¼ miles E.N.E. of this rock and 3 cables off shore is a patch of 3 fathoms. These dangers are marked usually by strong tide rips.

See chart, No. 219.

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Tides.—It is high water, full and change, at pulo Weh at 9h. 45m.; springs rise 7 feet, neaps about 3 feet.

In **Balahan bay**, nearly 2 miles in length, on the south-east side of pulo Weh, the water is deep, there being depths of 40 to 80 fathoms. Near the sandy shore, at its head, there is a depth of 15 fathoms at half a cable off, and no less water in which a vessel could safely anchor. Vessels can anchor here in both monsoons, but it offers most shelter during the south-west. The east and west shores of the bay are fronted by a reef to the distance of half a cable.

Somewhat inland from the anchorage is Balahan, the largest village on the island, and the residence of the chief of Weh. Near the village are fresh water springs and a stream. There is a sulphur mine in the vicinity, distant about 2 hours' walk.

Sekeh, the east point of entrance to the bay, is a lofty point with depths of 30 to 40 fathoms close-to.

Ayer Melek, a point midway on the east coast, has a rock above water just northward of it.

Tapa Gaja, the north-east point of the island, is not very high, but rises rapidly towards the mountains within.

SABANG BAY*, within the hill of Perimpun, the west extreme of Tapa Gaja, is nearly 1½ miles in length, the entrance between the Perimpun or Mason point and pulo Kelas being about half a mile wide; the depths are 25 fathoms and under, with a bottom of sand, coral, and gravel.

There is good anchorage at all times in the northern head about 2 cables off shore in from 16 to 20 fathoms. There is but little sea here even during the squalls of the south-west monsoon period, and at other times it is quite smooth. There are no dangers in the approach.

H.M.S. *Pallas*, 1893, anchored here in 16 fathoms, and her stern was very close to the shore reef. The Dutch gunboat here had a sternfast to the trees.

Lights.—A *fixed white* light will shortly be exhibited on the north-west point of pulo Kelas; and a *fixed red* light near Perimpun point.

Settlement.—Coaling station.—There is a provisional Dutch

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formed here; landing piers are in course of construction, and moorings are to be laid down. The village of Sabang, at the foot of the fort, is inhabited chiefly by Chinese; there are a few scattered dwellings on the south shore of the bay.

Pulo Kelas lies in the southern portion of Sabang bay, and is about 4 cables in length. It is a desert island, and entirely overgrown except on the east side; on its south side is a cove with a good landing place. Its west side is connected with pulo Weh by a reef with a least depth of 1½ fathoms on it. *See* Light, p. 48.

There is a channel eastward of Kelas leading to snug anchorage within it in 10 fathoms, mud, but it is reduced to a width of one cable in one place, by a rock on which there is only a depth of 2 feet. The depth in this channel is 3½ fathoms, but the rock would require to be buoyed beforehand.

Peria Laut bay, lies westward of the wooded promontory of Sekenu, about 300 feet high, the west extreme of Sabang bay. It is about 2 miles in length and in breadth, with good anchorage in from 9 to 12 fathoms near its head, just westward of Peria Laut stream, whose bar dries at low water. Just southward of point Murung a warm spring discharges, supposed to contain sulphur.

Reefs.—Between points Murung and Baleh Matien, at about 1¼ cables from the shore, is a patch of 5 fathoms; and at 2 cables northward of the latter is a patch of 4 fathoms; both are steep-to. The shore is fronted by a reef with rocks above water in places, to a short distance.

Tanjong Rubia is the rocky point situated about half a mile south-east of the island of that name. A reef with a rock above water extends about 2 cables north-eastward of it.

Ibu bay lies within pulo Rubia and is deep, but small craft find good anchorage in a cove near the island in 4 to 5 fathoms, over sandy bottom.

Pulo Rubia is 131 feet high, and Selako, northward of it, 197 feet high; a sunken rock lies about 2 cables northward of the latter. The coast from Ibu bay northward to Bahu, the north-west extreme of pulo Weh, is fringed by a reef to a short distance, and is steep-to beyond.

See chart, No. 219.

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The flood or south-east stream, increased by the easterly current which prevails northward of pulo Weh, sets into this bay at the rate of 3 miles an hour at springs; the ebb is much weaker.

NORTH COAST OF SUMATRA.—ACHEH OR ATJEH PROVINCE.

Aspect.—General remarks*.—The coast between Acheh head and Diamond point, about 140 miles in extent, is very varied; in places the cliffs rise precipitously from the sea to a considerable height, crowned by dense vegetation; in other portions there are sandy beaches, or cultivated plains reaching to the shore with numerous villages or kampongs scattered over them. At various distances inland are several prominent mountain peaks affording ready means for fixing the position of a vessel; many of these peaks are within 12 miles of the coast, and may possibly be recognised by the following description :—

Gle Raja or mount Param, 1,673 feet in height, is the highest portion of the range of which Acheh head is the northern extreme.

Gle Durung is the northernmost hill situated within Pedro point.

Gle Gaja is the highest peak of the chain of hills within Pedro point. These peaks, about 1,000 feet in height, are, however, much alike, being thinly wooded and undulating, and form the north-west spur of the Selawa Janten or Golden mountain.

Gle Ayer Panas, 984 feet in height, has a flat summit, and lies 5 miles south-westward of Batu Putih point; Gunong Eimperusong, with a green summit, lies midway between.

Gunong Melijung, 8 miles south-eastward of Batu Putih point, is dome-shaped, and 1,968 feet in height

Goudberg, or Selawa Janten, known also as Golden mountain, about 4 miles southward of Melijung, is cone-shaped, 5,663 feet in height, and visible from a distance of about 80 miles in exceptionally clear weather.

Pedir of Weesberg, or Selawa Betina (Orphan), 3,117 feet in height, 7 miles eastward of Goudberg, is easily recognised by its flattened cone, which has a slight depression in the middle.

Close to the coast, and about 4 miles westward of Merdu, is Trengading, a very steep hill 229 feet high, with a solitary tree on its summit. There are two conspicuous villages near it.

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Gle Tambineh, nearly 12 miles within Merdu, is 4,931 feet high, but not easily identified. Gle Samalanga, 4 miles north-eastward of it, is dome-shaped, and 3,950 feet high.

Gle Punchik, 4,806 feet high, 4 miles eastward of Gle Samalanga, is a flattened cone not easily recognised.

Bengalang, 5 miles within Raja point, is 951 feet high, with a flattish top.

Bukit Goh, or Elephant mountain, 3,445 feet in height, 10 miles within Pedada, resembles an elephant with its head to the westward.

Pedada, or Gle Ram, 1,345 feet high, 4 miles within Pedada, has a great rounded horn on its summit, very sloping to the westward and somewhat steeper to the eastward.

Gle Lamruja, between Pedada mount and Pasangan hills, is conspicuous.

Pasangan, or Gle Mung Mung, 984 feet high, has a thicket on its summit with two trees higher than the others.

Chunda range, known also as Gle Gardung, 25 miles from the coast, has two craters, shaped like truncated cones, on the east and west sides of the range; the eastern is 9,974 feet, and the western 10,698 feet in height.

Pasai range to the eastward attains a height of 5,249 feet but has no conspicuous summit.

About 16 miles south eastward of the Pasai is Tumian (Temin of Semuang), the summit of which is 5,741 feet above the sea. *Continued on p.* 66.

Winds.—Currents.—The remarks on winds, currents and climate of the north coast of Sumatra will be found in the first chapter.

COAST.—Acheh head to Pedro point.—Acheh head with King point situated 3½ miles to the southward of it form the north-west extreme of the island of Sumatra; both are bluff promontories, and the summit of the peninsula of which they form a part attains a height of 1,673 feet in Gle Raja, before-mentioned; Acheh head is steep-to beyond a short distance.

Between Acheh head and Pedro point are the two bays of Olehléh and Gigieng, separated by the point and spit at Acheh river. The coast at Acheh head and for about one mile to the eastward is rocky and steep, beyond which it is sandy for the whole distance to Pedro point; with the exception of Acheh head it may be approached by

See chart, No. 219.

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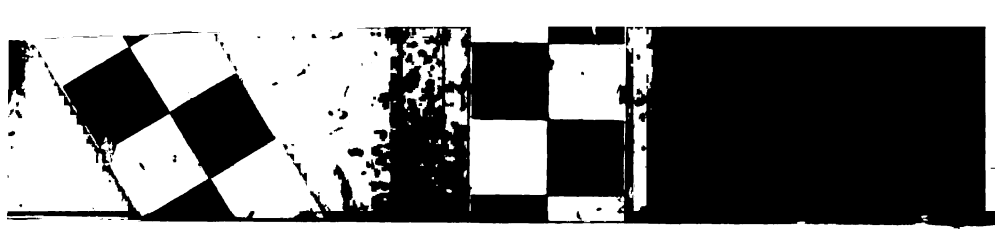

the lead, the bottom being composed of black sand for about 3 miles off shore, with white sand and shells beyond that distance.

In places, the sand on the shore has drifted to some height, forming sand hills, especially near Kwala Gigieng. The land within the sand ridges is in great part morass, with but scanty vegetation; here and there, however, trees of some height are to be found. The morass is intersected by creeks and lagoons, with footpaths connecting the several villages which are mostly situated on the higher ground. These villages are numerous and are usually surrounded by alang-alang woods, lofty cocoa nut trees, or cultivated ground. In the valley of Great Acheh is situated Kota Raja, the capital of the province of Acheh, about 1½ miles from the coast.

Kwala Najid Panchur is the mouth of the lagoon close eastward of Acheh head, and has a depth of 1½ feet at low water spring, by keeping within 50 yards of Acheh head. The lagoon is very shallow, and has a large village named Lampagar on its eastern shore.

Pulo Tuan* is a small dome-shaped islet, 128 feet in height, in the west part of Olehléh bay, at about three-quarters of a mile eastward of Acheh head, with which it is connected by a ridge of rocks above water in places; there is no available channel between it and the shore except for canoes. Depths of 5 fathoms are found to within a short distance of the north side of pulo Tuan.

Kwala Changkul is the mouth of the lagoon, one mile westward of Olehléh; it has a depth at low water springs of 3½ feet. The lagoon is shallow, but there are canoe passages leading southward of Olehléh to Acheh river to the eastward, and to Lampagar lagoon to the westward. Pagani block house, black with zinc roof, on the narrow spit of land westward of the entrance, is a conspicuous object.

OLEHLÉH,* the port of Kota Raja, the capital of Acheh, is situated on the eastern part of the narrow spit of sand which separates Changkul lagoon from the sea. It is connected with Kota Raja by a steam tramway 2½ miles in length.

Piers.—Light.—There are three landing piers; the westernmost or government pier is fitted with two steam cranes and connected with the steam tramway. A small *red fixed* light is shewn from it. The easternmost pier is used by lighters coaling vessels in the anchorage. There is a flagstaff near the Custom house, besides others.

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Supplies.—Coal.—Fresh beef, poultry, vegetables, bread, &c., are obtainable, and fruits when in season. There is no good drinking water. There is a fine hospital at Kota Raja, containing 800 beds.

About 7,000 tons of coal are kept in stock at Olehléh, shipped in lighters from the eastern wharf. Bad weather impedes coaling considerably. When the coaling establishment at pulo Weh (p. 48) is in working order, the Olehléh depôt will be abolished.

Trade.—The exports are pepper, betel nuts, gutta-percha and other gums, rattans and cocoa nuts. The imports are chiefly cattle from India, haberdashery, and all kinds of provisions. A considerable portion of the exports and imports are collected and distributed at Olehléh from and to other ports of Sumatra. *See* values for coasts of Sumatra, p. 8.

Shipping.—214 vessels entered in 1894, namely—5 Dutch, 24 British, 8 British India, 2 German, 1 Norwegian, 1 Japanese, and 173 Netherlands India (chiefly coasting craft); 203 vessels cleared.

Communication.—The Netherlands Indian steam vessels call five times monthly, and there are several steamers trading between Olehléh and Penang. Olehléh is connected with Penang, &c., and the principal ports of Sumatra by telegraph. *See also* pp. 8, 9.

Kota Raja, the capital of Acheh, lies about 2 miles east-south-east of Olehléh, on the west bank of Acheh river, and is connected to Olehléh by a steam tramway, which tramway also connects the military outposts. The governor of Acheh province resides here.

The Roadstead.—Olehléh bay* is said to afford good anchorage in about 5 fathoms, over black sand, abreast the piers. A good scope of cable should be given and vessels of deep draught should anchor farther off; a second anchor should be always in readiness to let go. The sea runs high at times in both monsoons and it is only during the change of the monsoons that smooth water can be depended on, for a week or two.

During the south-west monsoon violent gusts make their way through the valley southward of Acheh head, and during the north-east monsoon the sea and swell are at times so heavy that communication with the shore is interrupted. Land and sea breezes often blow during both seasons, but the land breezes do not extend

* *See* plan of Olehléh bay on chart, No. 219.

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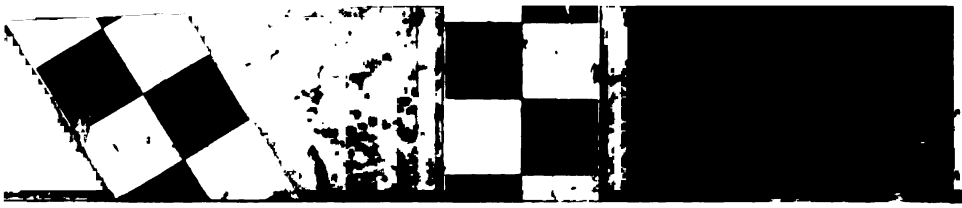

beyond the islands. The forenoon is generally calm and the best time for landing, &c. The roadstead is infested by sharks. *See* winds, &c., p. 22 ; and rainy season, &c., pp. 14–16.

Directions.—Approaching Olehléh road from the eastward, by keeping the perpendicular south fall of the hill 1½ miles within Acheh head, bearing S. 54° W. or southward of that bearing, the shallow water extending off Acheh river and eastward of it will be avoided. Coming from the westward, there are no dangers seaward of pulo Tuan. Directions for neighbouring coast, *see* p. 55.

Tides.—It is high water, full and change, at about 10 hours ; springs rise about 5 feet. The flood sets eastward, but weak, being retarded by the prevailing westerly current, which causes the ebb to run longer and with greater strength than the flood.

Acheh river.*—At nearly 3 miles north-eastward of Olehléh is the mouth of Acheh river, north-eastward of which the shore bank with 3 fathoms and less extends about one mile off shore ; it takes its rise in the Selawa Janten.

There are two shallow channels into the river ; the western one has usually 2 feet at low water springs and the eastern about one foot, but both the direction and depth are constantly changing so that no dependence can be placed on either. Within the entrance vessels of 4 feet draught can navigate to Kota Raja, the capital, and lesser draughts some distance above. The banks of the river are swampy as far as Jawa village, 2 miles up, and are partly inundated during the rainy season ; above the land is higher.

The river is bridged near Penajung and Kota Raja, and there are several villages on either bank. Canoe passages connect with the lagoons of Changkul and Gigieng on either side. Kota Pohoma, a military station with zinc roof, is conspicuous from the offing ; it is situated near the shore about midway between Acheh river and the mouth of Gigieng lagoon. Landing is easy here in the morning.

Gigieng lagoon lies within the low sand hills extending eastward of Acheh river, its entrance being about 4 miles eastward of that river. It is very shallow, but admits fairly large boats to ply between the military stations of Kota Pohoma and Pakan Krung Chut. The shore bank, within a depth of 6 fathoms, extends ½ miles seaward of the mouth of the lagoon ; eastward to Pedro

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MALACCA PASSAGE, 9 miles in breadth, separates pulo Weh from the north coast of Sumatra, and is the best approach to Olehléh from the northward.

Pulo Buru.—LIGHT.—Pulo Buru lies in Malacca passage at about 2½ miles from the shore, and is fringed by a reef to the distance of about 3 cables.

A *fixed white* light is exhibited from an iron standard on a white dwelling on pulo Buru at an elevation of 62 feet above high water, visible about 12 miles in clear weather.

PEDRO POINT to PEDIR POINT.—Between these points the hills come very near to the coast almost all the distance, and the flat swampy shore only attains to any considerable breadth on the west and south sides of Krung Raja bay. Here and there the coast is composed of chalk, or sandstone, and is steep, as at Lubuh, Batu Putih, Segi, and Pedir points; elsewhere the coast consists of sloping sandy soil and partly wooded. There are several unimportant streams, but most of the entrances to them are closed during a prolonged drought.

With the exception of the 4-fathoms patch in Krung Raja bay, and the shoal eastward of Batu Putih, there are no dangers beyond half a mile from the shore.

Anchorage should not be taken in less than 8 to 10 fathoms; the bottom is chiefly rocky, especially off the headlands.

Directions.—In sailing from Acheh along this part of the coast a sailing vessel should keep near the land, as in most parts temporary anchorage may be found. Also the bank fronting the shore within the 100 fathoms line, is fairly steep-to, with westerly and variable currents outside its limits, and calms are more prevalent in the offing than when the vessel is in soundings. Every advantage should be taken of the land wind, which sets in about 8 or 9 p.m., and continues through the night. The tidal streams near the shore are regular, but the ebb or western stream being combined with the current is much the stronger of the two.

Pedro point or Tanjong Batu, the north point of Sumatra, is a low headland, and may be recognised by the group of casuarina trees growing not far from the beach. Just to the westward is the entrance, dry at low water, to a shallow lagoon, generally marked by surf. A depth of 5 fathoms only will be found at half a mile off Pedro point.

See chart, No. 219.

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is dry at low water.

A patch with not less than 4 fathoms, steep-to, with from 10 to 20 fathoms at a short distance, lies in the western approach of Krung Raja bay, at 1¼ miles off shore, with pulo Kapal bearing E. by S. ¾ S., distant 2¼ miles, and pulo Buru a little open of Pedro point. It affords good temporary anchorage, and for that purpose should be approached with the latter marks as given.

Batu Kapal or Rangmajang is a sandstone rock about 3 cables off Lubah point, with a depth of 3 fathoms in the fairway between.

Batu Putih, or White cliff, lies 10½ miles eastward of Pedro point; it is a chalk and sandstone cliff, falling steeply to the sea, and easily recognised by the great white patch it makes in the green land. At about 1¼ miles eastward of the cliff the 5-fathoms line of soundings is nearly one mile off shore, with two patches of 3 fathoms nearly that distance off and steep-to. The Ayer Manis creek, dry in its mouth at low water, lies south from the eastern patch.

Villages.—The large village of Lampanas, surrounded by cocoa-nut trees, is situated on the coast at 4½ miles south-east of Batu Putih, and there is a long row of trees eastward of it. Segi bluff is a high portion of the coast midway between Batu Putih and Pedir point; between it and Lampanas is Lengah village, on the west side of entrance to Ayer Masin creek.

Rocks.—Three detached rocks, with about 2 feet at low water, lie just within the 3-fathoms contour line off the point, between

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Pedir point is easily recognised, being the extreme of the range of hills sloping steeply to the sea. A coral reef, steep-to, extends half a cable off the point. Half a mile off the depths are about 18 fathoms. A lagoon lies within the coast at about 2 miles westward of the point.

PEDIR POINT to RAJA POINT.—Between these points, 38 miles apart, the coast forms an indentation sometimes known as Pedir bay. It consists of a narrow strip of sandy coast covered by brushwood, with here and there groups of trees. Small fishing villages are scattered along the coast. Within it is swampy ground. Not far from the coast the land becomes undulating and is cultivated, fertile, and thickly populated.

The principal stream is the Pedir or Segli. Between the Segli and Enjung streams, from a half to one mile inland, is a series of thick cocoa-nut forests, in front of which the land is comparatively bare. Between the Enjung and Pantai Raja and at Trengading the hills touch the coast. Near Pantai Raja, and on either side of the mouth of Enjung stream, are three groups of high trees.

Eastward of Merdu point the cocoa-nut trees again approach the coast, until beyond Janka Buya, where they merge with the low forest land in which lies Samalangan. Landmarks are scarce along the coast, but there are no dangers beyond half a mile off it. The coast bank, with less than 3 fathoms, extends about one-third of a mile in places; in others, as between Ayer Labu and Beratjan, and between Samalangan and Raja point, it is steep-to.

Batu creek is situated about 4 miles south-eastward of Pedir point. About one mile westward of its entrance, and at half a mile off shore, there is a patch of 2½ fathoms, between the 3 and 5-fathoms lines.

Bengalang creek, 2 miles eastward of Batu creek, has a low water depth of 3 feet in its rather wide entrance. It has several high trees on its right bank, one standing much higher than the others, and two on its left bank, which render it easily recognisable.

Pedir or Segli river.—Pedir, the western mouth, dries at low water. Segli, the eastern mouth, has two entrances, but the westernmost dries at low water. The eastern entrance has a depth of 2 feet at low water, marked by stakes, but it is subject to

See chart, No. 219.

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considerable alteration both in direction and depth, and at times both the Pedir and Segli discharge through a common mouth.

Half a mile above the entrance the Segli is only navigable by canoes. The land is exceedingly fertile, and the population is considerable. Twenty-four miles up the stream is Kemala Dalem, where the claimant to the Sultanship of Acheh resides.

Segli.—The Dutch station of Segli is at the mouth of the stream and there are military posts on both sides of it. About one mile from it, connected by a good footpath, is the large village of Pedir and an old ruined Portuguese fort.

There is good anchorage in from 8 to 11 fathoms at about one mile off the coast in the neighbourhood of Segli river.

Communication.—The Netherlands India mail steamers call here (*see* p. 8), also trading steamers running between Olehléh and Penang.

COAST.—Burung village, about 5 miles eastward of Segli, is of some importance as a trading station.

The creek dries at low water.

Between it and Segli is the village of Gighen.

Ayer Labu river has a depth of one foot in its entrance at low water, and is much used for inland trade by boats ; springs rise about 5 feet. The mouth may be identified by a few cocoa-nut trees a little eastward of it ; a portion of the coast near it appears from the offing as a long sandy bare promontory. There is anchorage off Ayer Labu in 8 to 10 fathoms, but the shore is steep-to eastward of the river.

Enjung river, of some importance to trade, is situated about 4 miles eastward of Ayer Labu ; it has two entrances, each with a depth at low water of 3 feet, and there is a least depth of 4 feet to Enjung village, situated about 2 miles up, but near the coast as the river trends westward parallel to the coast within its mouth ; springs rise about 6 feet. The left bank of the river is sandy and thickly overgrown with brushwood.

A row of lofty trees, situated near the beach westward of the entrance, serves to identify it. To the eastward is a chain of

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The bottom seaward of the entrance deepens gradually to 10 or 12 fathoms at half a mile off shore. Small supplies of provisions may be procured at the village.

Pantai Raja, eastward of the Enjung, dries at low water and, is of no importance; the village of same name lies 2 miles up. Next eastward is the Trengading also of no importance.

Merdu point, lying 26 miles east-south-eastward of Pedir point is low and sandy with a few small trees; a run of water, resembling when at a distance a path in the valley, is conspicuous during the rainy season. A grove of trees is situate 1½ miles to the westward of the point.

Merdu village is half a mile from the sea on the banks of the small stream of the same name, which is available for boats. Eastward of the stream the coast is covered with cocoa-nut trees which continue along the coast to beyond Olim river.

Olim river at about 2 miles eastward of Merdu point, makes a considerable break in the cocoa-nut trees, being half a cable wide in its entrance, and therefore easily recognised. It usually has two channels with depths of 4 feet in each at low water, but they are constantly altering; springs rise about 6 to 7 feet. The river has depths of 4 to 5 fathoms within in places, but it is only 20 yards wide at Manjang village 5 miles up. The smaller village of Olim is one mile from the mouth.

Samalangan village is situated one mile up the river of the same name, which has a depth of one foot in its entrance at low water, and 2 to 3 feet as far as the village, with a breadth of about about 50 yards; springs rise about 6 feet. The outlets of the lagoon eastward of Samalangan are dry at low water.

The anchorage off Samalangan is in 12 to 15 fathoms at one mile off shore.

Communication.—The vessels of the Netherlands India Steam Company call off Samalangan at uncertain intervals, and also vessels trading between Penang and Olehléh.

RAJA POINT to KRUNG KUKUS.—The coast between these points, which are about 36 miles apart, is low and sandy, and wooded, with higher land a little within it. Between Pedada and Pasangan the

See chart, No. 219.

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w stretch of plain is covered with wide stretches of grass, interspersed y groves of trees. Near Agam Agam is a tree of great girth which very conspicuous, and there is good anchorage abreast it in 8 fathoms hen bearing from S.S.E. to S.S.W. There is a row of lofty trees on ither side of Krung Kukus river, giving the land the appearance of a romontory; the marshy land traversed by lagoons which lie within ie shore is only a narrow strip.

There are many villages along the coast, but good landmarks are arce; the promontories are all low and not so sharply defined as ose westward of Raja point. The hills are referred to on pp. 50, 51.

Rocks near the coast.—At $2\frac{3}{4}$ miles east of Raja point, is a oral patch of small extent with $4\frac{1}{4}$ fathoms, and steep-to, with mount engalang S.W. $\frac{3}{8}$ S. distant $5\frac{3}{4}$ miles; a rock, dry at low water, lies $\frac{1}{4}$ miles south-eastward of Raja point at about 3 cables off the Red ocks, within the 3-fathoms edge of the coast bank which extends out half a mile off shore between Raja and Pedada points.

Nearly one mile off Jempa are two coral patches with depths f $3\frac{1}{4}$ and 4 fathoms on them; and nearly three-quarters of a mile off gam Agam are two reefs (Karang Misjid) with one fathom only ver them, within the 5-fathoms line. Between Pasangan and nearly to rung Kukus the coast bank extends nearly half a mile off, but off ie latter and for some miles eastward the coast is steep-to, and ould not be approached within a depth of 10 fathoms; the bottom chiefly hard sand and small stones with coral in places, and the olding ground is indifferent.

Raja point, a low promontory, may be recognised at a consider- ble distance by a grove of high trees near its extremity; there is a epth of 5 fathoms near it, but it should not be approached to less an 8 fathoms or to the distance of half a mile.

Pedada point, the east extreme of the bay eastward of Raja oint, is low, and not easily recognised from the offing; a patch of ngle marks it. A depth of 5 fathoms will be found at one mile off edada point. The Pedada stream is navigable for boats; the village es on its right bank near the coast.

Jempa village is situated about 4 miles eastward of Pedada oint; it and its stream are of no importance. The dangers off it

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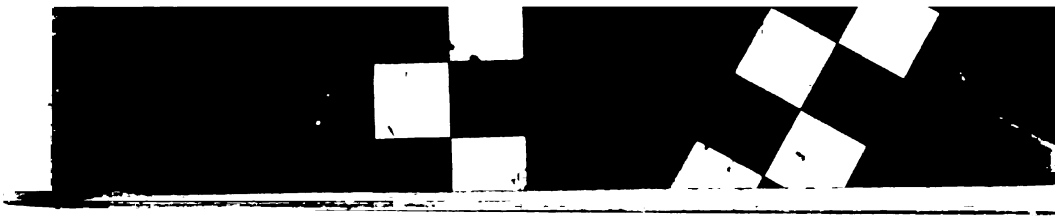

Belang point, 4 miles eastward of Jempa village, is a slight but conspicuous projection between the Doi and Meh streams and sparsely wooded. The 5-fathoms line is 2½ cables off shore. The Doi stream has a low water depth of 1½ feet, and a bank on which the sea breaks extends southward of the mouth; the shore here is low and sandy.

Pasangan point, situated 22 miles eastward of Raja point, is low and sandy, and may be recognised by three casuarina trees standing above the brushwood. The 5-fathoms line is a quarter of a mile off, beyond which the water deepens rapidly to 30 fathoms at one mile distant.

Pasangan river rises in the Chunda hills and has two entrances; that which discharges at Pasangan point has a low water depth of 3 feet, but it is constantly altering; the depth is about the same in the lagoon within, but farther inland it is much shallower.

Jangka, the west entrance has about 2 feet at low water in its entrance, and joins the main branch about three miles up. Jangka village is situated on the left bank.

Baru river.—The mouth of Baru river lies about 2 miles south-eastward of Pasangan point, with Elephant mountain in line with Pasangan mount. It is the principal outlet of the Sawang or Maneh river which broke through here in 1892, at which time there was a depth of 6 feet at low water in the entrance, and from 5 to 12 feet within, and (with a few patches of less water) as far up as Maneh. It is subject to considerable change.

The Maneh entrance, westward of Maneh village is almost closed. The various outlets of the Maneh are connected by shallow lagoons.

Agam Agam is the projection of the coast eastward of Maneh, off which the Karang Misjid dangers mentioned on p. 60, extend nearly three-quarters of a mile, steep-to on their seaward side. There is a conspicuous tree hereabouts, referred to on the same page.

Krung Kukus.—The mouth of the river of that name is easily recognised by the groups of dark casuarina trees standing on either side. It is of some importance, and has a low water depth of 2 feet (springs rise about 7 feet), and there is about the same depth to Krung Kukus village, about one mile up. Above this the depths are

See chart, No. 219.

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from 2 to 3 fathoms, and on the left bank are sand hills about 24 feet high, whilst the opposite bank is covered with thick brushwood, in some places dense jungle.

There are shallow passages through the lagoons to Bungkas to the westward, and to Telok Semawi to the eastward, from abreast the village.

There is good anchorage in 10 fathoms abreast the mouth of Krung Kukus.

KRUNG KUKUS to JAMBU AYER or DIAMOND POINT.—Between these points which are 27 miles apart, the coast forms a deep bight known as Telok Semawi. The shore is sandy backed by a narrow strip of swampy forest land, within which at about one mile distant it becomes hilly. Eastward of Chunda the hills draw away from the coast in a south-east direction, and the extensive plain begins which is widest at Jambu Ayer point and extends all along the east coast of Sumatra. The Kertei and Jambu Ayer streams which with their tributaries irrigate a wide tract of land, enter the sea on this coast.

The following are good landmarks on this coast :—the grove of trees at the mouth of the Pasei ; two high trees on the left bank of the mouth of the Kertei ; the groves of trees at Changkul and Pidada ; the conspicuous tree westward of Telaga Batang with its two great trunks, and the wide-spreading tree within Jambu Ayer which from the westward makes as a low islet.

Banks.—The shore between Krung Kukus and the south-west extreme of Semawi island is steep-to, there being a depth of 10 fathoms or more at a short distance from it ; but thence eastward to Jambu Ayer a sandbank fronts the shore with a depth of 5 fathoms and less to the distance of about 4 miles, on which are several shallow coral patches. Patches of 2 to 3 fathoms (Karang, Pare, and Bada) extend about 2½ miles off Pidada, and the sandbank with 3 fathoms and less extends about the same distance north-west of Jambu Ayer point.

Karang Tenga, a coral reef with 2¾ fathoms, and from 12 to 14 fathoms around lies 2½ miles off shore, with Jambu Ayer point bearing E. by S. ¼ S., 8¼ miles, and Solitary tree S.E. by S.

Karang Timau just dries at low water, and lies about midway and a little eastward of a line joining Karang Tenga and the solitary

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Minjak is a patch of 6 fathoms, with 15 to 20 fathoms around, about 1½ miles northward of Karang Tenga, with Jambu Ayer point bearing about E. by S. ¾ S. distant 9½ miles. The bottom near the shore is sand, and a short distance off it is sand mixed with mud and coral, whilst in the offing it is clay and mud.

Mamplan creek separates the island of Semawi from the main. Its entrance, situated about 5 miles eastward of Krung Kukus, has a depth of one foot only at low water; within its entrance and the island there are depths of 2 fathoms in places. Its banks are swampy, with villages here and there, amongst which are those of the chiefs of Semawi and Chunda. The Mamplan communicates with the Krung Kukus by swampy and shallow passages available only for canoes.

Barat Laut, the north-east extreme of Semawi island, is a sandy promontory easily recognized by the high trees just within it. The point is steep-to with 15 to 20 fathoms at a short distance.

Semawi island, about 4 miles in length by one in breadth, is marshy and unproductive.

Telok Semawi, the bay between Semawi island and Kertei river, is 7 miles wide. The anchorage, at half a mile eastward of Semawi pier, has depths of 8 to 12 fathoms, blue mud, but it is exposed during the north-east monsoon period. The bay is fronted by a bank with less than 3 fathoms to about three-quarters of a mile off shore. Telok Semawi may easily be recognized by the Chunda hills, a remarkable ridge 500 feet high at about 2 miles west of the village; these hills are cleared of trees and the light green grass renders them distinguishable.

Semawi town is a Dutch military station on the south-east extreme of the island of Semawi. There is a pier on the east side of the island, but loading and discharging is difficult here at times; it is intended to build another on the west side, in Chunda lagoon. The entrance to the lagoon has a depth of 3 feet on its bar at low water.

Semawi is an important port for the inland trade owing to the good boat harbour in the lagoon and the inland water communication from thence by Mamplan creek to Krung Kukus, &c. The Meraksa stream enters the bay southward of Semawi and has a least

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See chart, No. 219.

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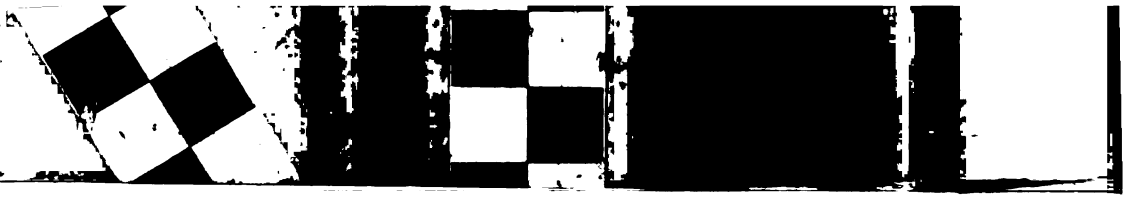

depth of 2 feet on its bar, with from one to 2 fathoms within for some distance. The village of same name lies near its mouth and that of Baju about 2 miles up.

Pasai river lies 4 miles eastward of the Meraksa, and has a least depth of 2 feet in its entrance. Gedong village is situated about 2 miles up, and a little beyond is that of Kola Karang; craft of 3 feet draught can reach there, but the channel is tortuous.

Supplies.—Communication.—Water and provisions may be obtained at Semawi. The Netherlands India Company's steamers call here monthly, and occasionally steamers running between Olehléh and Penang.

Kertei river, about 7½ miles eastward of Semawi, is 150 yards wide in its entrance and not less than 100 yards for a distance of 7 miles up. Its bar has a low water depth of 2 feet (springs rise 6 feet), and with the exception of a bar with 6 feet abreast Lapong, a little above the entrance, the depths are from 2 to 5 fathoms. Craft of 6 feet draught can enter.

It is a rapid fresh water stream rising far inland, and its mouth is easily recognized by two lofty trees rising conspicuously about the brushwood. The banks near its mouth are low and covered with brushwood, with villages here and there. Farther up the banks are higher; at Belang Pusi on the right bank and Merbu on the left bank about 4 miles up, they are from 5 to 6 feet above high water. Here the country is thickly populated and the land under cultivation. The capital of Kertei province is on the Jirit Majong, the first tributary from the westward above the entrance; it has a depth of 6 to 10 feet and is about 15 yards wide. The town is also named Jirit Majong, and is about one mile up.

Anchorage.—There is good anchorage off the Kertei in about 5 fathoms, with the Kertei trees bearing South, distant about two miles.

Pidada river, nearly 4 miles eastward of the Kertei, has also a low water depth of 2 feet in its entrance, and may be recognized by the conspicuous grove of trees close to it. There are depths of 3 to 4 fathoms in the river, between banks of mangroves.

Jambu Ayer river enters the sea at about one mile westward of the point of the same name, separates the province of Kertei from that of Simpang Olim, and takes its rise at a considerable distance in

the interior. It is about 100 yards wide in its entrance, with a low water depth of 3 feet, but it is usually breaking at that time. Springs rise about 9 feet.

Steam vessels of 4 and 5 feet draught can ascend for about 16 miles; it is not, however, easily navigated as there is always a strong downward current, with many snags in the rainy season, and the channel is tortuous. The river is not much used by the natives for trade purposes owing chiefly to its shifting and dangerous bar. Produce is generally taken through an artificial canal to the Simpang Olim for shipment. The banks of the lower portion of the river are low and swampy, and overgrown with mangroves; above they gradually grow higher and the vegetation more luxuriant, with many villages, pepper gardens, &c. Above Baba Lung, about 20 miles up, the banks are about 25 feet above the river. The tide is felt up to Tepin Kujon about 2 miles above the entrance.

Jambu Ayer or **Diamond point,** is a sandy promontory just above high water, within which are a few casuarina trees; the coast line seems to be slowly receding.

A spit extends off from Jambu Ayer point about three-quarters of a mile in a north-westerly direction, with a depth of 18 feet on its edge; it is somewhat steep-to on its eastern side, over which the sea breaks in places. Vessels should not approach the spit to a less depth than 10 fathoms, especially during the north-east monsoon, when a heavy swell will be experienced.

Tides.—It is high water, full and change, at Jambu Ayer point at noon; springs rise 9 feet. The flood sets south-east, and the ebb north-westward, but between Jambu Ayer point and the Aroa islands the set varies a point or two according to the direction of the coast. The ebb being increased by the prevailing north-westerly current is stronger and of longer duration than the flood, and, at springs the ebb is sometimes as much as 3 knots an hour; but, when the distance from the shore is considerable, it seldom exceeds 1½ knots.

Near the coast westward of Jambu Ayer point the tidal streams are weak.

EAST COAST OF SUMATRA.*

Jambu Ayer to Tamiang point.—Aspect.—The land between the points mentioned, presents from the offing one uniform stretch of high woodland with scarcely any perceptible interruptions. Inland,

* *See* charts, Nos. 219 and 1,353.

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a chain of mountains trending south-south-eastward, a continuation the chain in the northernmost part of Acheh, p. 51.

The Tumian (Temin of Semuang) summit is the northernmost rtion which can be distinguished, it lies about 28 miles from the st and is only visible in clear weather, but its rounded top render useless as a mark ; referred to also on p. 51.

In the parallel of Tamiang point, a spur of this range comes thin 6 miles of the coast with two recognisable summits, namely miang and Flat hill. Near Edi Rajut and Pedowa also the hills proach the coast.

Pedowa hills are situated near the parallel of Perlak ; they are w and rounded hills and the highest is distinguished by a leafless e on its western declivity.

Kwala Edi Rajut can be distinguished by the masts of the many all vessels usually lying there ; and possibly by the Pedowa hills niles to the southward.

A waterfall in lat. 4° 24¼′ S., long. 97° 41½ E., appearing as a light eak on the mountain side, is visible off and southward of Langksa.

The land within the sandy strip of shore is mostly low and swampy l covered with mangroves ; at the mouths of the streams there is nerally more sand and these spots are marked by casuarina trees.

A sand and mud bank with depths of one to 3 fathoms fronts the re to a considerable distance in places ; beyond it the bottom is d, or sand and mud.

The principal streams are the Simpang Olim, the Arakundar, Edi- ut, and the Perlak, and there are many creeks intersecting the mps ; many of them dry at their entrances at low water, and are ject to considerable change.

wing to the nature of the land the country is but thinly populated ; inhabitants are mostly fishermen and their villages are usually at mouths of the several streams and not conspicuous from the ıg.

Winds.—Regular land and sea breezes are experienced on this of the coast in February, March, and April, the latter portion of north-east monsoon. *See* also p. 22.

uring the strength of the north-east monsoon this coast should be n a wide berth by a sailing vessel, there being usually a heavy l rolling on it at that season.

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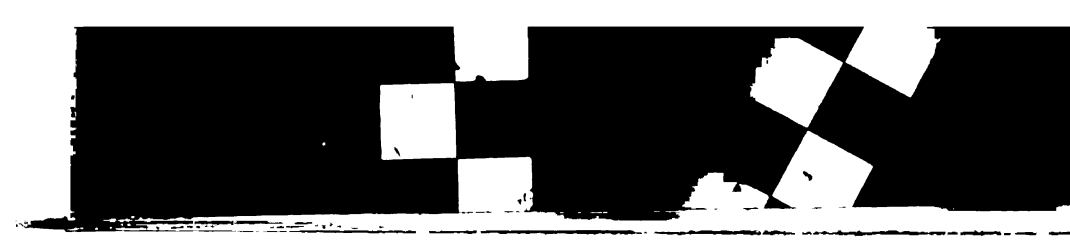

Pare Busuk and Ringin.—Between 3 and 6 miles southward of Jambu Ayer or Diamond point are the low sandy islands of Pare Busuk and Ringin, within the edge of the coast bank and separated by a shallow lagoon from the shore. To seaward the coast bank is fairly steep-to. The islands are covered by lofty casuarina and other trees, and are conspicuous from the offing.

Rusa creek debouches just southward of Ringin island; it communicates with the Jambu Ayer at Babulung village, up to which it is navigable for craft of 4 feet draught. The banks are swampy near its mouth, but farther up there are scattered villages on higher ground under cultivation.

Sungi Belas, southward of the Rusa, is also navigable for craft of 4 feet draught; it communicates with the Rusa, and also with the Simpang Olim.

A patch of 5 fathoms, with about 10 fathoms around, lies $1\frac{3}{4}$ miles off shore abreast the Belas entrance.

Simpang Olim river*, situated 9 miles south-eastward of Jambu Ayer, is one of the deepest on this coast. It has a depth of 10 feet on its bar at high water springs, and from 2 to 6 and 7 fathoms within, as far as the Rusa branch; the village of Simpang Olim is situated about 6 miles above the entrance. The channel over the bar is marked by stakes and is subject to considerable change. The bank fronting the river, with depths of less than 3 fathoms, extends about one mile off.

The river banks are swampy with many creeks discharging through them; near the village there is higher ground.

Steile or Steep point, 2 miles south-eastward of Simping Olim, is a low sandy tongue, with a thick casuarina wood, which from the offing appears like a steep headland; hence its name. It may be approached by the lead.

Malihan creek, close southward of Steile point, has a depth at high water of 7 feet in its entrance, with a considerable depth within, the water discharging into it from many creeks from the morass around; it is of no importance.

ARAKUNDUR RIVER*, the next south-eastward of Malihan creek, is one of the most important on this coast, being broad and

See plan on chart, No. 219.

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traight, and therefore easy to navigate. There is a depth of 10 feet n its bar at high water springs, close along the northern point of ntrance, and ample room within for vessels that can enter, there being rom 2 to 5 fathoms for some distance.

Vessels of 6 feet draught can ascend to Arasan Belu island, just bove which there is a bar with a low water depth of 6 feet. Boats an reach Semantoh; some distance above this it connects with the ambu Ayer.

The banks of the river are swampy nearly up to Telok Sintang illage, where there is a small supply of good well water. Above his the ground becomes higher and the wooded land is interspersed vith pepper plantations. At Tepung Kuleh, just above Sintang, here is a fresh water stream.

Julok creek, the next southward, has a low water depth of feet and about 10 feet at high water springs on its bar; craft of feet draught can ascend to Rantau Panjang village, above which is narrow; it is no great distance beyond to Julok Besar village.

Gelumpang village, surrounded by cocoa-nut trees, lies within the ntrance with a swamp behind it.

The Buging, Bagah and Edi Chut creeks to the south-eastward re dry at low water and of no importance. The ground near them all swampy.

EDI RAJUT RIVER* is a winding river from 20 to 30 yards road, with a depth of about 9 feet on its bar at high water springs, nd admits of small trading craft ascending to Edi village, about miles up. The channel is subject to change, but is marked by akes. The Custom house is on the right bank at the mouth, from hence there is a good bridle path to Edi.

Anchorage.—There is anchorage off the river in 5 fathoms, with he Custom house about S.W. by W., distant 1½ miles; it is exposed uring the north-east monsoon period, and communication with the hore is at times impracticable. The masts of the small craft in the ver serve to identify it from the offing. There is also a conspicuous ree known as the tree of Edi, standing on a fairly high hill in the eighbourhood, but its position is not definitely shown.

Edi or Edi Rajut is one of the most important places on the ast coast of Acheh and the seat of its administration.

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Trade.—Edi is an open port, and represents the centre of the east coast trade, which is chiefly in the hands of Penang merchants. The exports are pepper, gutta percha, wax, rattans, and hides. The imports are provisions, petroleum, hardware, and agricultural implements. *See* values for East coast, p. 8.

Communication.—Fortnightly, *viâ* Deli to Singapore, *see* p. 8; also vessels trading between Olehléh and Penang call here.

Pedowa Kechil and **Pedowa Besar** are two shallow streams, navigable by boats only to the villages of like names on their banks.

Ujong Perlak, situated about 32 miles south-eastward of Jambu Ayer or Diamond point, is a low and sandy point covered with tall trees, which with the Pedowa hills 4 miles within, render it easy of recognition. A bank with less than 3 fathoms extends 2 miles eastward and about 3½ miles northward of the point; spots on it are dry and others nearly so at low water, and the sea nearly always breaks over it. The bank may be approached by the lead.

Perlak river is apparently nearly dry at low water in its entrance, but a short distance within there is a depth of 2 fathoms. The channel is marked by stakes. The somewhat large village of Perlak is situated about 10 miles up stream, though only about 1½ miles from the shore abreast. The river banks in its lower portion are marshy, and the first fishing village is about 2 miles up. Above Perlak the ground is higher and there are pepper gardens and other plantations.

UJONG PERLAK to LANGKSA BAY and UJONG TAMIANG.—The coast between these points, which are about 36 miles apart, is uniformly low, covered with tolerably high trees, and intersected by many unimportant creeks; about midway is Langksa bay. A strip of sand fronts it for the whole distance, with mangroves growing in the morass behind it, and here and there are shallow lagoons between the morass and the sand. Beyond a few fishing stations the coast is almost uninhabited. The sandy shore is conspicuous from the offing in places, namely at Perlak, the mouth of the Jinki, Langksa point, and between the Telaga Muku and Iju creeks; between the last-mentioned creeks there is a long row of casuarina trees, and also fronting the lagoon southward of the mouth of the Jinki.

See chart, No. 1,353.

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The coast is fronted by a mudbank with less than 3 fathoms, from one to 2 miles off shore, and abreast Langksa bay to nearly 3 miles off; it may be approached by the lead in most places, but off Perolin island in Langksa bay, and between Pantei Kerma creek and Tamiang it is steep-to, dropping quickly to 10 fathoms and more.

Landmark.—The principal landmark in clear weather off this coast is the waterfall referred to on p. 66. It is about 23 miles within Langksa bay, and 2,887 feet above the sea.

Boga creek, about 2½ miles southward of Ujong Perlak, was formerly of importance as being a short route to Perlak settlement, but it has so silted up as to be only available for canoes.

Lagot creek, 7 miles southward of Ujong Perlak, is a good boat-passage to Perlak settlement, southward of which it connects with Perlak river.

Jinki creek is only available for boats; its banks are marshy and intersected by smaller creeks; about 6 miles up is the village of Krut Renchong, at the fork of two streams, above which the land is less swampy, and cultivated. There is a fishing village at the mouth of the Jinki.

Raja creek is available for boats; there is a fishing village on the coast, and 5 miles up is the village of Baru; Raja village is about 8 miles up.

Bajang river, between Perolin island and the main, is navigable for some distance by its northern entrance for vessels of 7 feet draught; depths of 3 to 6 fathoms are found within the bar for some distance. Its banks are swampy and intersected by numerous creeks. At Randau Panjang village about 10 miles up, the river divides; the northernmost leads to Simpang Aras and the western to Bagoh. The entrance south of Perolin is very shallow.

Perolin island, about 2½ miles in length by one mile in width, is low, sandy, covered with casuarina trees and is easily recognised by them. Shallow water extends about 3½ miles eastward of it and is steep-to beyond, as before mentioned.

LANGKSA BAY,* lying between Perolin island and Langksa point, is 4½ miles wide and the same in depth. The bay contains numerous shoals, between which there are narrow boat channels

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leading to the various streams that discharge into it. Near Langksa point, but separated by a channel 300 yards wide, lies pulo Telaga Toju, about a mile in extent, and having a shallow bank which extends nearly 2 miles seaward. The island is covered with trees, and can only be distinguished from the mainland when coming from the south-eastward.

Tides.—It is high water, full and change, in Langksa bay at 11h. 30m.; springs rise 7 feet. The streams run with considerable strength in the mouths of the rivers.

Langksa river.—The entrances to Langksa river lie on either side of pulo Telaga Toju, and southward of pulo Rawa. Pulo Tikus lies westward of pulo Rawa; both are covered with tall mangroves and are uninhabited.

The western channel, named Telok Dalam, has a depth at high water springs, of 20 feet, but it is very tortuous.

The eastern channel, known as Kwala Langksa, has a depth of 16 feet at high water springs, but is easier navigated. The tree on Langksa point bearing S.W. $\frac{3}{4}$ S. leads in the deepest water over the bar.

These channels can only be entered with local knowledge. There is good anchorage in the approach, for small craft, in about 5 fathoms, with Langksa point bearing S.W. $\frac{1}{2}$ W., and also abreast this point.

The point is sandy, with a casuarina wood on it. There is also a block house here inhabited by Europeans, and a few native houses.

Langksa village, the principal one, is about 14 miles up; the river is deep for some miles, but is tortuous; boats can go up to the village. The principal products are tobacco, rice, pepper, and rattans.

Biring river, westward of the Langksa, has a depth of 16 feet at high water springs; some distance within the depths are as much as 15 fathoms, but the channel is tortuous. The Majapahit or Raja Tua, eastward of the Langksa, has a least depth of 6 feet, is 450 yards wide in the entrance, and is deep within, but a shallow bank fronts it to the distance of 2 miles. The village of same name is 11 miles up. The Raja Muda has a least depth of 3 feet.

Rukui island, about 3 miles eastward of Langksa point, is only an island at near high water, at which time there is a passage for

See chart, No. 1,353.

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canoes only. The tall casuarina trees on the east side of Rukui stream are conspicuous; the mouth of the stream dries at low water.

The **Telaga Muku** river, nearly 5 miles westward of Ujong Tamiang, is about a mile wide in its entrance; its channel, marked by stake beacons, is dry in places at low water.

Hiju river is situated eastward of the Muku; on the coast between there is a sandy beach with a long row of casuarina trees. The estuary of this river is about 1½ miles broad, but nearly blocked by shoals dry at low water; the channel is on the western side, and has a depth of 13 feet at high water springs, marked by two stake beacons. Vessels of 6 feet draught can ascend nearly to Hiju village. Near its mouth is a channel to the Tamiang, with a least depth of 10 feet.

UJONG TAMIANG.—This projecting point may be readily identified from all directions by the groups of casuarina trees situated on either side of the mouth of the river, and which are visible from a distance of about 16 miles. A bank fronts the point to the distance of about one mile, in places not covered at high water; it is steep-to, with a depth of 20 fathoms within a short distance.

A bank of small extent lies E.N.E. distant 4¾ miles from Ujong Tamiang. The least water found was 13 fathoms, with 20 to 23 fathoms around.

Tamiang river.*—The main outlet of this river, Kwala Besar, lies close westward of Ujong Tamiang, and is about 300 yards broad. Its channel to the sea is round the point, between it and the dry sand bank seaward of it, which portion of the channel is sometimes dry at low water. It is well beaconed, and the depth in the river is considerable, but the channel is tortuous.

The entrance by the Hiju and its connection with the Tamiang affords deeper water, as mentioned above.

Seruwai, the chief town of the district of Tamiang, and a military post, is situated about 10 miles up the river. A small steamer maintains fortnightly communications with Deli river, &c.

Tides.—It is high water, full and change, off Ujong Tamiang at

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UJONG TAMIANG to TANJONG TANJUNG—General remarks.—The portion of the coast of Sumatra between Ujong Tamiang and Tanjong Tanjung (Mati point) is low, thickly covered with vegetation, and consists entirely of an alluvial formation, intersected by numerous small rivers, but few of which are navigable even for small craft. The shore is composed of mud overgrown with mangrove trees, here and there intercepted by strips of sandy beach on which casuarina trees are almost always to be found; these are markedly distinguishable from the mangrove owing to their darker colour, greater height, and the fine needle-like foliage, many of which may be seen from a distance of 20 miles in clear weather.

Where the mangrove grows, the ground is inundated and the mangroves extend back many hundreds of yards; within them the ground is marshy in places, but mostly the land is firm with tall trees growing on it.

Landing on the coast other than by making use of the river channels is in no case advisable, and in the event of any sea or swell, which occurs particularly during the north-east monsoon period, is impracticable. At high water, during calms, landing may be effected on the sandy beaches, but not where mangroves exist, as the ground, if any, is all soft mud. In clear weather some low hills and the mountains inland referred to below, will be sighted from the offing above the trees on the coast.

In most places the shore may be approached by the lead.

Inhabitants.—In consequence of the unfitness for habitation of a great portion of the coast, there are but few settlements of any importance in the immediate vicinity of it; they lie further inland on the various rivers. Many of these rivers have, however, at their mouths a fishing settlement or *bagan* as it is termed, a collection of miserable huts. The appearance of the coast is, therefore, very monotonous, and it is not always easy to identify the locality in which a vessel may be, without some local knowledge of the points and various remarkable groups of trees.

Fishing stakes.—*See* p. 29.

Aspect.—Mountains.—About 53 miles westward of Ujong Tamiang, in Gajuland, is the eastern end of the Acheh or Atjeh range of mountains. A noticeable peak, the highest point of a broad mountain ridge, is 10,202 feet in height, and is situated in about

See chart, No. 1,353.

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lat. 4° 16′ N., long. 97° 25′ E. A waterfall, 2,887 feet in height, about 23 miles from the coast, and north-eastward of the mountain, is a conspicuous object in clear weather to vessels northward of Ujong Tamiang ; referred to on p. 66.

About 17 miles southward of the waterfall is the northern end of the Alas range of mountains in Alas land ; this range extends about 50 miles in a north and south direction. Bendahara, one of the highest peaks, is 9,940 feet above the sea. Southward of the sources of Deli river, in Batakland, is the Batak range extending nearly parallel to the coast for about 36 miles ; Jinabung attains a height of 8,136 feet.

From June to February the summits of these ranges are frequently visible from Malacca strait, especially in the morning, but from February to June they are only seen occasionally.

Between Langksa and Aru bays, at about 6 miles back, ranges of hills attain a height of 300 to 600 feet ; but eastward of Aru bay the rise is much more gradual. The coast between Langksa bay and Ujong Tamiang is intersected by a number of small streams, with sandy spots in places and clumps of casuarina trees fronting the regular growth of trees. A few fishing huts are generally found in the mouths of the streams.

The coast between Ujong Tamiang and Langkat river forms a bay about 30 miles in breadth and 9 miles in depth. At its head are two large islands, the northern one is pulo Kampei, and the southern pulo Tampalis or Sembilan. This bay is fronted by mud flats with less than one fathom, varying from 1½ to 5 miles off shore, and with less than 3 fathoms water to about 6 miles off shore, towards which the depths decrease gradually except off the extreme points ; the bottom consists of mud, sand, shells, and clay.

Fishing stakes exist on some of the banks, and sometimes as far off as a depth of 7 fathoms.

Aspect.—Between Ujong Tamiang and Raja Ulak there are several sandy beaches, upon which near Krung Bekah and Raja Ulak are groups of casuarina trees. Southward of the latter, as far as pulo Kampei, the coast consists entirely of mud covered with mangrove trees.

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ward to Gebong river the coast is all mud and mangroves, but beyond there are sandy spots in places with casuarina trees. Flat hill, 509 feet high westward of pulo Kampei, is a useful mark.

There are several unimportant streams between Ujong Tamiang and pulo Kampei, mostly dry in some portions of their channels at low water. The Ayer Masin stream has a depth of 8½ feet, and the Seranjaya about 10 feet on its bar at high water springs. The latter bar is situated 2½ miles E. by N. from the north end of pulo Kampei. At Krung Bekah, the south extreme of an islet 2 miles southward of Ujong Tamiang, is a village of Chinese fishermen and traders. may be recognised by some tall casuarina trees.

ARU BAY, within pulo Kampei and pulo Tampalis, is 3 miles in breadth by 6 miles in length. A great portion of it is dry at low water, with numerous shallow channels leading to the several streams discharging into the bay; these unite in two channels, which may be considered as the continuation of the largest of these rivers, and principally of the Besitan and Salahaji.

Towards the head of the bay are a number of mud islets overgrown with mangrove trees; the shores of the bay are mostly of the same formation, so that with the exception of the settlements on pulo Kampei, there are no others of any importance until some distance up the rivers.

Entrances.—The most northerly of the entrances to Aru bay is the Kampei channel, between Kampei and Tampalis islands; the southernmost, the Sembilan channel, lies between Tampalis and the main; the latter is the deeper, having about 12 feet least water. Between these are a number of ridges which dry in places at low water.

Communication.—There is coasting communication with Deli about once every fortnight.

Pulo Kampei consists principally of firm and comparatively high ground, low at the shores, which are for the most part overgrown with mangroves. At the south point, where is the settlement, and on the south-east side, are sandy beaches; on the latter is a group of casuarina trees.

The island is covered with tall trees, the tops of which are visible from a considerable distance; the highest is about half a mile from

See chart, No. 1,353.

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ts south end, has a round top, and is easily identified. In the niddle of the island there are pepper gardens and other plantations.

The settlement, on the south point, has no European inhabi-ants ; a vassal of the Sultan of Langkat and a native overseer are tationed here, in fortified dwellings. The inhabitants are either ishermen or agriculturists. Poultry, fish, and good water are btainable. There is considerable traffic between the settlement and thers on the rivers in Aru bay, carried on by canoes.

Pulo Tampalis or Sembilan is also covered with tall trees, with nangrove shores, except the north-west and south extremes, which onsist of sand. On the first-mentioned extreme there are a few ishermen's huts, and upon the south point there are sawyer's works, small settlement, and two piers.

Kampei channel.—Buoyage.—The bar of the Kampei has a epth of 19 feet at high water, springs, but the channel indicated by he buoys, which is straight, has a depth of 16 feet only. The bar nd the banks on either side are composed of sand, but the bottom f the channel is mud.

The outer buoy, with ball, lies in 5 fathoms, with the mouth of the Babalan river S. by W. $\frac{1}{8}$ W. and Flat hill W. $\frac{1}{4}$ N. Within this buoy, he channel is marked by four buoys, two on either side. (*See* ystem, p. 9.)

Directions.—From seaward, by bringing Flat hill to bear V. $\frac{1}{4}$ N. and steering for it will lead to the outer buoy ; thence for he high tree near the south end of pulo Kampei, bearing about .S.W., when the channel buoys will shortly be seen. Vessels should ot enter without local knowledge.

Tides.—It is high water, full and change, at noon ; springs rise feet. At Kampei settlement the tide is half an hour later, with alf a foot more rise, and probably much more in Aru bay. The ighest tides occur from 2 to 3 days after full and change of the oon. There are two high and two low tides in the 24 hours ; and om 2 days before to 5 or 6 days after the full and change the se is nearly as much as at springs ; neaps rise about 3 feet.

The streams run fairly through the channel, at the maximum rate

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flood setting south-eastward from about 3 hours before to about 3 hours after high water, and the ebb in the opposite direction, both at the rate of about 1½ knots.

Anchorage.—There is good anchorage about 1½ cables off Kampei settlement in 5 to 7 fathoms, with the south point of the island bearing N.E. ½ N.; here the fairway is about 4 cables wide. The water is much deeper farther out. A patch of 3 fathoms, stones, lies with the south point of Kampei N.E. by N., and west point of Seranjaya river N.W. ⅜ N.

Salahaji river discharges into the north-west portion of Aru bay, northward of Tanjong Siata. Abreast the point is the bar of the river, which bar has a depth of 12 feet at high water springs, the channel being marked by stone beacons.

Westward of Tanjong Siata the ground is firm, rising behind; here are two old piers with a depth of 18 feet alongside, the remains of the former settlement of Pangkalan Siata.

Sembilan channel.—Buoyage.—The entrance to Sembilan channel lies eastward of that of the Kampei channel. It has a least depth in the fairway at high water springs of 12 feet, which shallow spot is situated southward of the fishing stakes; the bottom here is hard sand. Within the stakes the depths increase to 7 and 8 fathoms, and are not less than 3½ fathoms until abreast the south-west point of pulo Tampalis, where there is a short bar with 3 fathoms. The channel is but 1¼ cables wide in one place, and the banks are steep-to and dry in places.

The outer buoy, with ball, lies in 3 fathoms, with Flat hill bearing W. by N. ⅔ N., and Babalan mouth S.S.W. Within, six buoys mark the starboard side of the channel on entering, and five buoys the port side. These buoys are not to be depended on. Two large groups of fishing stakes, one mile apart, are situated on the bank on the north-west side of the channel. (*See* System of buoyage, p. 9.)

Directions.—It is not advisable to attempt this channel without local knowledge. The fairway buoy may be made from the eastward by approaching Flat hill on the bearing of W. by N. ⅔ N., as given above; and from the northward by steering for the high tree near the south end of pulo Kampei when bearing about West. From abreast the outer buoy, steer to pass between the buoys marking the sides of the channel.

See chart, No. 1,353.

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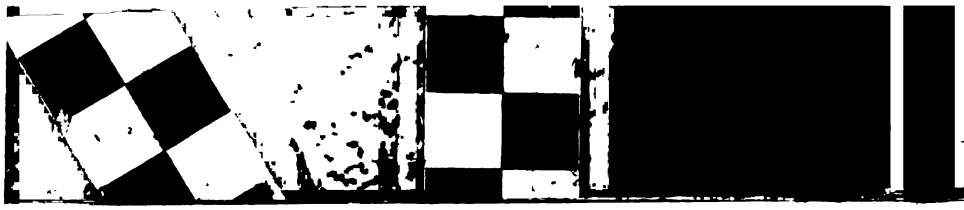

ove pulo Tampalis the channel is somewhat intricate, and the
s steep-to, up to Pangkalan Susu, but the depth is not less
15 feet in the channel at low water; above this the water
s rapidly. The shore is chiefly mangrove.

sitan river discharges into the southern head of Aru bay; it
avigable for vessels of about 6 feet draught, and may be
ached by either the Kampei or Sembilan channels. The
ary post of Bukit Kubu is situated on it, at about 12 miles from
ettlement on pulo Kampei.

abalan river, about 5 miles eastward of pulo Tampalis, has a
depth of 4 feet in its channel, and is only available for small
with local knowledge. Its bed is composed of hard sand and
, and on either side are hard sand ridges partly dry at low
r.

bout 4 miles above its mouth, on the southern shore, is the fort
angkalan-Berandan of the Royal Company for working petroleum
s in Langkat. Here is a pier with a depth of 11 feet alongside
xtreme at low water; the river is about 200 yards wide abreast
ith a depth of 7 fathoms midway; the depths are shallow and
gular a short distance above. It is high water in Babalan channel
h. 15m., springs rise 7 feet. (*See* Remarks on tides, p. 28.)

uoys.—Two small white nun buoys mark the starboard hand
two black buoys the port hand, on entering.

epan river, eastward of the Babalan, is narrow and tortuous,
has a least depth of 2 feet in its approach.

ebong and **Serapo** rivers lie 7 and 8 miles, respectively, east-
d of the Babalan; the coast between is composed of mud and
ngroves, but on the eastern side of the mouth of both streams is a
ly beach. The depth in the approach to them over the bank
nting the coast is about 11 feet at high water springs.

Ujong Damar is the most projecting portion of the coast
veen Serapo and Langkat river. It consists of sand, overgrown
h dark tall trees, which are visible from a distance of about
miles.

LANGKAT RIVER is about half a mile wide in its entrance'
between Ujong Damar and pulo Tapakuda, and is easily identified
n seaward by the high trees on those points; those on the latter

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approach at high water springs, which extend about 4 miles off, and are very steep-to; its eastern side should not be approached to less than 14 fathoms. Within the bar the depths are not less than 12 feet at low water. The bottom is composed of tolerably hard sand and mud, and the banks on either side are hard, steep-to, and dry in places at low water.

About 2 miles above the east point of entrance the river is only about 45 yards wide, barely room for vessels to pass one another.

Buoyage.—The fairway to the river is marked by an outer buoy, with ball, in 4 fathoms, with the lighthouse bearing about South, distant 4½ miles, and by sixteen channel buoys, eight on either side; *see* System, p. 9. There are fishing stakes on both sides of the channel.

Tides.—It is high water, full and change, at 1h.; springs rise 7 feet; *see* also p. 28. The streams run at the rate of 2½ knots in the river.

LIGHT.—From a wooden support, with a large white board (to render the position distinguishable in the daytime) on the west point of entrance to Langkat river, is exhibited at an elevation of 28 feet above high water, a *fixed white* light, visible from a distance of about 10 miles.

Directions.—The fairway buoy should be approached from a north-easterly direction, whence the channel is between the buoys on either side; within, the concave side of the river should be followed, but it should not be attempted without local knowledge.

Town.—Communication.—Kelambir or Tanjong Pura, about 12 miles up the river, is the capital of the province of Langkat, and the seat of government. There is a garrison, a post, and telegraph office. Steam communication is maintained regularly with Penang, Deli, &c.

Some Europeans reside here, and there are numbers of Chinese labourers, in addition to the native population.

Trade.—The petroleum oil springs and the refining works near Langkat are in full working order; the production of raw petroleum in 1893 amounted to 250,000 litres per diem, and the output of refined oil for the year to 401,370 cases. The greater portion is sent by steamers to Penang and Singapore.

THE COAST.—Between Langkat and Deli rivers, in the various river mouths are a number of islets, the most prominent of which is Tapakuda, about 2 miles eastward of Langkat river; it is formed

See chart, No. 1,353.

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and, and is thickly covered with tall casuarina trees. A shallow
extends about one mile off it. Pulo Paho, south-east of it, is
similar character, composed of mud and mangroves.

apakuda river, westward of these islands, has a depth of
eet in its approach at high water springs in a narrow channel
r the bank, in which the tidal streams run with considerable
ngth. The small rivers between it and Deli river are nearly dry
ow water, and the coast is fronted in places by a shallow bank
ending to the distance of about 2 miles.

Ujong Batu Chamal is a rounded point situated about 6 miles
rthward of Deli river; it and Ahu point, westward of it, has a
ndy beach, with a few casuarina trees, but they are not easily
entified.

Karang Gading is a bank, with depths of less than 3 fathoms,
rd bottom, extending from Batu Chamal, about 7 miles in a north-
est direction parallel to the coast, and with depths of less than
fathoms for 4 miles beyond. It may be approached by the lead;
nd there are numerous fishing stakes on it.

COAST.—General remarks.—From Batu Chamal past Deli
iver to Sirdang river, a distance of 15 miles south-eastward, the
oast consists almost entirely of mud and mangrove; beyond the
Sirdang, and past Ujong Sibunja Bunja, there is a considerable
mount of sandy beach, with casuarina and other tall trees, as far
eastward as the remarkable tree of Mengkudu; thence past Telok
Baharu there is again mud and mangrove, succeeded by sandy shores
with a luxuriant growth of casuarinas, up to Tanjong Tanjung (Mati).
The whole is fronted by a shallow bank, varying from a half to 3 miles
off shore, with the Deli and Bunja shoals in the offing.

In accordance with the more habitable character of the coast, there
are, at several places close to the sea, fishing stations of some size, of
which, however, but little can be seen from the offing. There are also
numerous fishing stakes on the banks fronting the shore, mostly
within the 3-fathoms limit, but near Bedagei they extend out to the
depth of 5 fathoms. Most of the banks can be approached by the
lead, but that on the east side of the approach to Deli river is steep-to,
as is also the bank eastward of Telok Mengkudu. The depths also
and the bottom contains more

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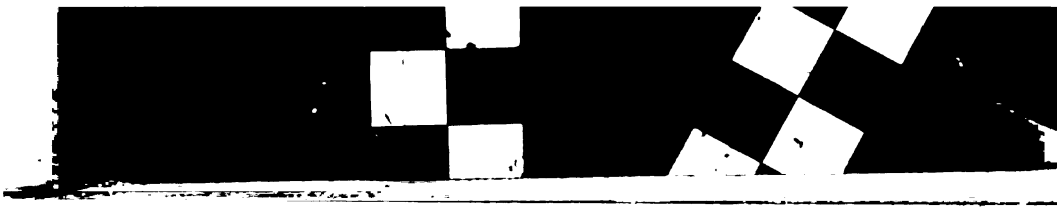

DELI RIVER.—Belawan mouth.—Deli river lies about 5 miles southward of Ujong Batu Chamal, and has two entrances, with pulo Belawan lying between them. The northern mouth, the Belawan, has a depth of 14 feet at high water springs, in the buoyed channel over the mud flat which fronts the coast to the distance of about 4 miles. Within the flat the water deepens, there being from 6 to 8 fathoms abreast the town of Belawan. This anchorage, since the construction of the railway to the interior, has become the principal harbour of the Deli district.

Within the bar the sides of the channel are tolerably steep-to; those on the east side of the bank are of hard sand, whilst to the westward is the extensive mud bank which fronts the shore; the bottom in the fairway is mud.

The southern mouth is shallow and barred by the railway bridge which crosses it to pulo Belawan.

LIGHTS.—A light vessel, or more properly a buoy, painted red, with one mast, carrying a ball, and the word *Deli* in white letters on her sides, lies in about $3\frac{1}{2}$ fathoms, with Ujong Belawan bearing S.S.W. $\frac{5}{8}$ W., distant $5\frac{4}{10}$ miles. The light is a *fixed white* light, elevated about 23 feet above the sea, and visible in clear weather from a distance of 8 miles. A bell is rung by the action of the sea.

The light is a gas light, and the vessel or buoy is charged every three months with gas; towards the end of the period the light becomes dim, when probably it will not be seen so far as the distance mentioned.

A *fixed white* light is exhibited, at an elevation of 46 feet, from an iron structure on south side of entrance to the Deli mouth.

Buoyage.—The channel of the Belawan mouth is marked by an outer buoy with ball, situated S. $\frac{1}{4}$ W. about 9 cables from the light vessel, and by several channel buoys. (*See* System, p. 9.)

Tides.—It is high water, full and change, at 2h. 30m.; springs rise 7 feet. At springs, the flood stream in the river runs at the rate of $1\frac{3}{4}$ knots, and the ebb about $2\frac{3}{4}$ knots, turning from one to 2 hours after high and low water, respectively. At the light vessel the streams run from $1\frac{1}{2}$ to 2 knots, across the entrance, the flood to the south-eastward and the ebb to the north-westward. The remarks on tides, p. 28, apply also here.

* *See* plan of Deli river, on chart No. 1,353.

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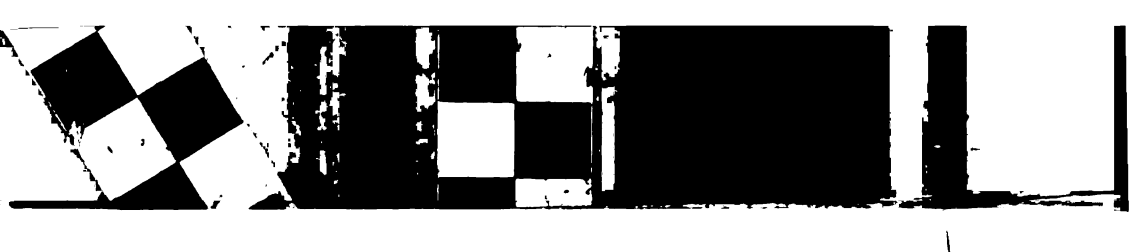

Between Penang and Deli, it is stated that a south-easterly set, ore particularly in the months of September and October, should guarded against; this statement must be received with caution, as e prevailing set in the strait is in the opposite direction.

Outer anchorage.—Vessels may anchor near the light vessel, or tside her, according to draught. A good position is in 9 fathoms, th the entrance of Belawan river in line with a gap in the ountains, bearing S.W. ½ W., about 6 miles from the entrance.

Directions.—The light vessel marks the approach to the Belawan outh of the Deli river, from whence the outer buoy will be seen out one mile southward of it; within the outer buoy, the channel between the buoys on either side, up to the town, and apparently esents no difficulty. Vessels of 10 feet draught can enter, at any gh water, but it would be advisable to secure the services of me one acquainted with the river, on a first visit. There are no gular pilots.

Pulo Belawan.—Harbour.—Pulo Belawan is formed chiefly of nd and mangroves. On the west side is the town and harbour of lawan, and on the east the fishing village or bagan. A railway nnects the town with Medan. The harbour has depths of 5 to athoms, but it is somewhat narrow in places, rendering it desirable moor. Local steamers lie alongside their own wharves. Depths 5 to 6 fathoms are maintained for some distance above the town; t only steam launches and boats can now ascend to Labuan Deli.

Settlement.—Belawan is the terminus of the Deli railway, and is all sides surrounded by mud and mangroves in great part flooded high water. There are wharves in front of it for the use of the ssels of the various trading companies. Most of the Europeans ide at Labuan Deli or other places near the railway line.

Supplies.—Coal.—There is a Government coal wharf, and pier th a depth of 18 feet alongside at low water. Near the railway is artesian well from which good drinking water is obtainable. ood for fuel which is commonly used by the coasting steamers is tainable, but for supplies of provisions it is necessary to send up Labuan Deli.

Communication.—There is constant steam communication with nang and Singapore, and a Dutch mail steamer maintains commu- ation with other ports in Sumatra (*see* p. 8 for mails and egraphs). There is telephonic communication with Medan, &c.

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Medan.—Labuan Deli about 2½ miles above Belawan, is now only administratively and in name, the port of Deli.

Medan, the capital of Deli, is about 8 miles above Labuan Deli; it is the head quarters of the Dutch Resident of the East coast of Sumatra, and of the chief of the military government of the district. It owes its importance, as does also the whole district, to the extensive cultivation of tobacco. There is a garrison here and a post and telegraphic service.

The railway from Belawan passes through Labuan Deli to Medan, and to Deli Tua, 6 miles beyond; from Medan there is a branch to Binji, 12 miles to the westward, and to Sirdang and Bobongan, about 12 and 20 miles, respectively, to the eastward.

Climate.—The health of the country may be considered good, though unseasonable weather often brings epidemics of fever, and berri-berri, especially among new comers. Isolated cases of cholera occur. The mornings are fresh and cool.

Deli district is made up of three states; Deli in the centre under a sultan; Langkat to the northward under a native chief or Pangheran; and Sirdang to the southward, also under a sultan; the whole being under the Dutch resident at Medan.

There is a German consul at Deli, and a branch of the Chartered Bank of India, Australia, and China. Population about 12,000.

Trade.—Deli district has rapidly increased in importance in the last 20 years on account of its extensive tobacco plantations. Several large companies have been formed, mostly Dutch; the principal English firm is the Langkat Plantation Company. Most of the carrying trade is in the hands of Messrs. Holt's line. It is shipped from Kelambir on the Langkat river, Deli, and from Sirdang river.

Shipping.—701 vessels entered the Deli district ports in 1894; of these, 99 were British, 63 German, 241 Penang, 162 Singapore, 108 Siamese, and 28 Netherlands India. *See* values of trade, p. 8.

OFF-LYING BANKS.—Deli bank is the general name of the banks situated within the 10-fathoms line of soundings, extending from about 10 miles north-eastward of Deli light vessel to about 8 miles north-eastward of Sijengi point. It is about 22 miles in length north-west and south-east, and from 2 to 4 miles in breadth.

See chart, No. 1,353.

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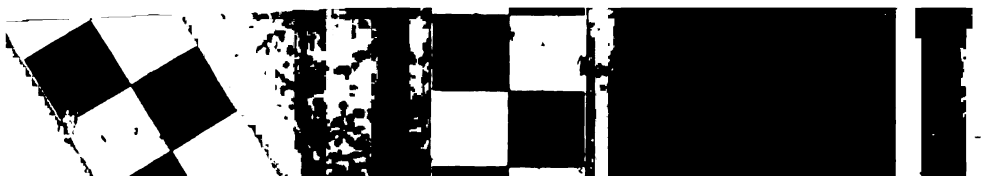

Bunja shoals.—Buoys.—These shoals form the southern part of Deli bank, and consist of two parallel ridges of sand. northernmost, with depths of one to 3 fathoms, is within the thoms limit, 6½ miles in length in a north-west and south-east ection, with a bottom of mud, and sand and shells, tolerably hard. north-west extreme is marked by a black and white vertically ped buoy with staff and ball, in 3½ fathoms, with Berhala bearing ¼ S., and the tall tree of Mengkudu S.S.E. ½ E. The least depth t its north-east end which is steep-to on its south side. The th-east side of the shoal is also steep-to.

The southernmost ridge, with depths of 1¼ to 3 fathoms, is 6 miles ength within the depth of five fathoms. Its south-east extreme narked by a black and white horizontally striped buoy with staff ball, in 2½ fathoms, with Berhala E. ⅝ N., and the tall tree of ngkudu S.S.E. ⅝ E. The minimum depth is 4½ cables within the oy. The shallow portions of both ridges are generally marked by e-rips, and with any swell these will break. Between these als and the bank fronting the shore, rippings and discolouration he water are frequently observed.

Clearing marks.—In the absence of the buoys, pulo Berhala k bearing E. ½ S. leads one mile northward of Bunja shoals, and same object bearing E. by N. leads southward of them. The st extreme of the casuarina trees on Sibunja Bunja bearing S.S.W. ds westward, and bearing W.S.W. leads south-eastward of the als. It is not advisable to stand into less than 18 fathoms when sing these banks at night.

Sijengi ridge, about 4 miles in length, lies parallel to the coast d 1½ miles distant from the mouth of Sijengi river; the least pth is 1¼ fathoms, tolerably hard bottom, with a depth of 5 to athoms northward and southward of it. Isolated patches of 4½ to athoms, lie between it and Bunja shoals.

COAST (continued from p. 81).—Between Deli river and njong Tanjung or Mati there are several small rivers, the entrances which are passable only by small trading craft at or near high ter; the most important have small lights at the entrances. Ujong rling, 2 miles eastward of the Deli river is overgrown with mangrove es, off which a mud bank dries at low water to the distance of

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one mile. Close eastward is the Panglima river, dry in its entrance at low water. About 3 miles farther eastward is the Perchut, also dry at low water. There is a fishing station at its mouth, and the village of Perchut at about 4 miles up.

Sirdang river, about 10 miles eastward of Deli river, is in one of the Deli tobacco growing districts already described. It is about 90 yards wide in its entrance and nearly dry at low water springs in its approach. The channel is marked by stakes. The shore bank on either side dries off about half a mile. Westward of the mouth is a strip of sandy beach, and beyond it the small river Tuan; eastward of the mouth as far as Kuru river the shore is sandy, with cocoanut trees at intervals, near which are fishing huts; $2\frac{1}{2}$ miles eastward of the Sirdang is a tree 197 feet in height, close to the shore, forming a conspicuous mark; it is known as the Sirdang tree.

Settlements.—The village at the mouth of the Sirdang is named Rantau Panjang. A few supplies are obtainable here. About 6 miles up and not far from the river bank, is the Sirdang station of the Deli railway, p. 83.

Kuru Ular and Denai rivers, from 3 to 5 miles eastward of the Sirdang are all nearly dry at low water; the two latter are about 3 cables apart; the coast eastward of the Kuru is chiefly mud and mangroves. Near the Denai is an extensive grove of trees.

Ujong Sibunja Bunja.—At one mile eastward of the Denai, the mangroves give place to a sandy beach, which continues to Ujong Sibunja Bunja, with casuarina trees in places. Near the point there is a small but dense wood of these trees which serve to distinguish it in the offing. The bank dries off here about $1\frac{1}{2}$ cables only, and there is a depth of 3 fathoms at about three-quarters of a mile off shore. Patches of $4\frac{1}{2}$ fathoms with deeper water around, lie about 2 miles off.

Perbuangan river, dry at low water in its entrance lies close eastward of Ujong Sibunja Bunja; between, within the hook of the point is a shallow and muddy lagoon about one mile in length.

LIGHT.—A small *fixed white* light is exhibited from a conspicuous white shed on the west point of the entrance.

See chart, No. 1,353.

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ıere is a fishing station in the wood near the light. A bad road
ı through tobacco plantations to the Perbuangan station of the
railway, distant about 5½ miles in a direct line.

jengi river.—From the Perbuangan river, the coast is sandy
ijengi point, which point is marked by some casuarina trees.
e villages lie within, not visible from seaward. The shore bank
s off about 3 cables. Sijengi ridge is described on p. 84.

elok Mengkudu.—Conspicuous tree.—Between Sijengi
r and Mengkudu tree, 8 miles eastward, the coast, fronted by a
ly beach forms a slight bight, known as Telok Mengkudu.

Between are the small streams, Baharu, Pa Nipa and Mengkudu, all
at low water.

Mengkudu tree is 220 feet in height and visible in the offing from
stance of about 18 miles; its roots are being undermined by the
and it may possibly be down in a few years; within it, however,
re are other tall trees but of less height. The depth in Telok
ngkudu is but 3 fathoms at 2½ miles off shore; off the tree there
he same depth at 1½ miles off.

Bedagei river, 4½ miles south-eastward of Mengkudu tree is one
le wide in its entrance with a depth of one foot at low water
ings over the bank in its approach. There is a little beach on
ıer side of the mouth of the river; and from the offing, a high
od just eastward of the river, and some groups of trees farther
tward, serve to identify it. The shore mud bank dries off to the
tance of 3 cables, and the depth is 3 fathoms at one mile off shore.
ıulk is moored in the roadstead.

LIGHT.—At a small village just within the east point of entrance
the river, two *fixed white* lights placed *vertically* are exhibited,
ible from a distance of about 6 miles when abreast the entrance.

Padang river.—From Bedagei river to the Padang, 5 miles south-
tward, the coast is all mud and mangroves. The eastern point of
Padang has a small sand beach.

Padang river is 4 cables wide in its estuary, and has a depth of 1½ feet
over the bank in its approach (springs rise about

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breadth, is marked by beacons on either side as far up as the settlement. The outer beacons are about half a mile N.N.E. ½ E. of the mouth. There are numerous fishing stakes about.

Settlement.—The settlement is situated about half a mile above the entrance, on the western bank. Coasting steamers and other trading craft call here in connection with the tobacco plantations situated farther inland. *See* communication, p. 8.

Paguruwan river, 2½ miles south-eastward of the Padang river, with a mangrove coast between, is 4 cables wide in its entrance, which is perpendicular to the coast, and therefore easily discerned from the offing. It is 1½ cables wide abreast the settlement on the eastern shore, one mile above the entrance. The depth is but 1½ feet at low water springs in the channel over the bank fronting it; springs rise 7 feet.

The channel is marked by beacons on either side as far as the settlement, the outer one being about half a mile seaward of the mouth. A conspicuous tree, 190 feet high, stands on the east point of the entrance. At night, by steering for the light, when bearing S.S.W. ¼ W., will lead to the outer beacon.

LIGHT.—Near the Custom house at the settlement, on the eastern shore, two *fixed white* lights, placed *vertically*, are exhibited, visible between the bearings of S. by W. and S.W. by S. (the direction of the channel) from a distance of about 6 miles.

Trade.—Small coasting steamers and other trading craft call here in connection with the tobacco plantations situated inland.

Pare Pare river, 3 miles south-eastward of the Paguruwan with a mangrove coast between, is about 5 cables wide in its estuary which is known as Telok Baharu. It has a least depth of 1½ feet at low water springs over the bank in its approach, and the west side of the channel is marked by stake beacons, the outer one being about 2½ cables off shore. The shore mud bank dries off about 4 cables between the Paguruwan and Telok Baharu, decreasing eastward towards Tanjong Tanjung to one cable, where it is sand.

The small settlement named Baharu is not visible from seaward. There is but little trade here, and the light formerly exhibited has been discontinued.

See chart, No. 1,353.

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jong Badak Mati.—From about one mile eastward of Telok aru, the coast gradually changes from mud and mangroves to a y beach, with casuarina trees in places.

jong Badak Mati is almost entirely sand, and is distinguised by a row of those trees. The small settlements on this coast are not ble from seaward.

anjong Tanjung and Tanjung river.—(Mati point).—About iles south-eastward of Badak Mati is Tanjung, a somewhat ninent point, beyond which the coast turns sharply to the south- d. The coast between has a sandy beach, and it is less densely ered with vegetation than that farther westward; at about half a e westward of the point there is a clump of casuarina trees, and same distance beyond is a clump of cocoa-nut trees. (The point nerly known as Mati point is now called Tanjung, and the river ch bisects it is known as Tanjung river.) The point eastward of river is thickly wooded with tall trees close down to the beach; bout one mile southward of it the sandy shore again gives place angroves. Off the point the bank dries about 3 cables, and is p-to beyond. The tidal streams cause a race here.

here is fairly good anchorage westward of the point in 7 to athoms, with the casuarina wood bearing S. by E.

anjung river is about three-quarters of a cable wide in its entrance, its channel, marked by stake beacons, has a depth of half a foot at low water springs; springs rise about 7 feet. A portion of coast bank forming the east side of the channel to the river only ers at high water springs.

ettlements.—There is a small settlement near the entrance, and bout 4 hours, journey up stream there are several European acco plantations. A small coasting steamer from Asahan river s here monthly.

Iati bank, the western extreme of which is about 2 miles off jong Tanjung, is about 8 miles in length, parallel to the coast mile in breadth, and with a least depth of 1½ fathoms near its stern end, from which Badak Mati bears W. ½ N., and Kwala jung S.W. by W. ¾ W. It is composed chiefly of hard sand, and steep-to in places. The group of casuarina trees westward of

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the 3-fathoms edge of the bank. There is deep water inshore of it, but a patch of 2¼ fathoms lies nearly in mid-channel.

Outer Mati bank.—Two patches of 4¾ fathoms are charted about 5 miles north-eastward of Mati bank, and the same distance apart. The depths around are from 5 to 10 fathoms, and the bottom consists of mud and sand and shells; the mud mainly consists of volcanic ashes. Some discolouration is observable during the strength of the tidal streams.

Tides.—It is high water, full and change, at Tanjong Tanjung, at 3 hours, springs rise about 7 feet, *see* also p. 28. The flood or south-eastern stream runs from about 4 hours before until 2 hours after high water, and the ebb the reverse, at the rate of 2 to 3 knots at springs, respectively.

PULO BERHALA lies about 22 miles north-eastward of Bedagei river, the nearest part of the island of Sumatra, in about lat. 3° 46½′ N., long. 99° 29½′ E.; it is a capital landmark, and is visible from a distance of about 30 miles in clear weather. By night also it can usually be distinguished at a fairly safe distance.

The island is mostly steep-to; on the north side a depth of 13 fathoms is found close-to, with 26 fathoms at a short distance; elsewhere the water is deep.

The island, composed of rock thickly covered with vegetation, is about 760 yards in length, north-west and south-east, by 660 yards in breadth, and the tops of its trees, near the north-west end, are 590 feet above high water.

At three-quarters of a cable from its south-east point is a wooded islet, 154 feet in height to the top of its trees, connected with the island by a coral ridge dry at low water.

At half a mile north-west of Berhala is a similar rock islet, 164 feet in height to the top of its trees; here and there it shows white. There is a somewhat large grotto in it. A patch of 7 fathoms lies between Berhala and this islet, and depths of 6 to 8 fathoms will be found extending 2 cables eastward of the islet.

The south side of Berhala is fronted by a coral reef to the distance of a half to one cable. Here are two sandy beaches separated by a rocky point; the eastern one affords the best landing. Natives of Sumatra visit it from time to time to collect turtles' eggs. On the western beach a stream of water discharges in the rainy season.

See chart, No. 794.

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Anchorage.—On that portion of the ridge extending south-ward of Berhala anchorage may be obtained in 9 fathoms, r sand and shells, with the summit of the island bearing W. by W. ¼ W., and at about 4 cables from the nearest point of the and.

This ridge extends north-westward of the island, and includes rhala bank. Five miles south-westward of Berhala is another ge with a minimum depth of 8 fathoms.

Berhala bank, within a depth of 10 fathoms, is about 7 miles in ngth in a north-west and south-east direction by about one mile in eadth. The least water is 6 fathoms, with pulo Berhala bearing S.E. ¼ E., distant about 10 miles. It affords good anchorage over ud and sand. Northward of the bank and connected with it is nother ridge with depths of 10 to 15 fathoms. The water is dis-bloured over the banks during the strength of the tidal streams, and here are occasional tide rips.

Tides.—It is high water, full and change, at 2h. 45m.; springs ise 7 feet. (*See* remarks on tides, p. 28.)

THE BROTHERS are situated 26 and 29 miles south-eastward of pulo Berhala, in the track of vessels navigating along the coast of Sumatra. They are visible from 18 to 22 miles in clear weather, and being steep-to beyond the distance of about 1½ cables, would usually be seen at night in time to avoid them. They are uninhabited, but natives from Sumatra usually visit them in the turtle season.

Pulo Pandang, the northern islet, is a thickly wooded rocky islet about 820 yards in length, consisting of two parts connected together by a sandy ridge. The northern portion is 223 feet, and the southern portion 121 feet, in height. The islet is surrounded by a reef to the distance of 1½ cables in places, with some rocks above water on it. On the ridge extending south-eastward of the islet a depth of 10 fathoms will be found at 6½ cables from it, but the holding ground is bad, and the sides of the ridge steep-to.

Anchorage, however, may be taken, south-east or north-west of the islet, in 14 to 16 fathoms, over mud and sand, with the islet distant about 9 cables in both cases. On either side of these ridges, of

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The best landing place, when there is no north-westerly swell, is on the small beach in the middle of the west side of the northern portion of the islet. Here is a pit in which water collects during rains. Near the ridge connecting the two portions of the islet is a small creek where a boat may ride at anchor.

Salanama, the southern Brother, lies about 5 miles S.S.W. of pulo Pandang, and 10 miles from the coast of Sumatra. It is 850 yards in length, 330 yards in breadth, and the tops of its trees attain a height of 298 feet above high water. The island is densely wooded with trees and ferns, and its rocky sides rise steeply from the sea. A small beach, covered at high water, on the south-east side, offers the most practicable landing.

A rock 26 feet high, lies about 1½ cables northward of the islet, and one 39 feet high lies 4½ cables E.S.E. from the south point of the islet. Beyond the distance of a cable the islet and rocks are free from danger. Temporary anchorage, in from 13 to 15 fathoms, will be found on the east, south-east, south-west, and north-west sides of the islet at a distance of about 2 cables. The islet affords no fresh water.

COAST.—General remarks.—The character of the coast between Tanjong Tanjung and Asahan river is similar to that described on p. 84 ; it is without exception low and covered with vegetation. The Brothers, in the offing, the mouths of the Batu Bara and Asahan, and Tanjongs Tanjung and Timbun Tulang, when near the coast, are the only objects readily identified. The Batu Bara and the Asahan are the only two small rivers of any importance.

Fishing stakes may be found as far off as a depth of 5 fathoms.

Mountains (continued from p. 74).—From 45 to 50 miles within the coast the Batak mountains extend in a south-easterly direction until abreast or south-west of Sungi Panei, eastward of which there is no further trace of mountains to be seen from the offing. The most noticeable are a broad mountain ridge within Batu Bara with two flat summits, each about 7,300 feet in height, eastward of which is a conical peak 7,054 feet in height, in lat. about 2° 35′ N., long. 99° 6′ E. ; here the range terminates. Nearer the coast is a noticeable sharp peak 5,709 feet in height, eastward of which the height of the range increases to the Asahan range.

See chart, No. 794.

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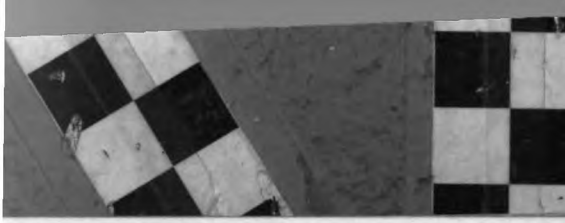

Surungan, 7,250 feet in height, is the highest and the most uth-easterly peak of the Asahan range ; it is fairly sharp, sloping n the west and precipitous on the east side.

Kwalu range.—At 17 miles southward of Surungan, is the highest oint of the Kwalu range ; it is in lat. about 2° 11′ N., long. 99° 21′ E., nd very noticeable, being conical and 7,677 feet in height. little eastward is a sharp-sided hummock 6,988 feet in height, onspicuous when bearing about South ; south-eastward of it is a onical peak 6,922 feet in height.

All the above mountains are in the independent Batak country.

Sikumpulah or **Bila range**, with some flat summits, lie in utch territory. The highest peak, 6,496 feet, lies in lat. bout 2° 5½′ N., long. 99° 30′ E. Two others attain a height of about 000 feet.

The peaks of the Asahan, Kwalu, and Bila ranges may be seen in ear weather as far south-eastward as off the Rokan river. They e usually visible in the early morning, but less so in the months f February to May than in the other months of the year.

THE COAST.—Between Tanjong Tanjung and Bata Baru river he coast is fronted by a sandy beach for the whole distance, with he exception of half a mile of mud and mangroves northward of embus river.

The coast bank dries off half a mile or more in places and is enerally firm mud mixed with sand. It may everywhere be pproached by the lead, but the north-east edge of the bank off anjong Timbun Tulang is somewhat steep-to. The bottom consists f mud, sand, shells, rock and coral ; the two last named being found iefly near the islands.

The Gembus, Perupuk, and Pijai streams are only available for ery small trading craft or boats, the mouths being all dry at low ater. A few huts are visible from seaward, near the Gembus and erupuk.

Batu Bara river is the common mouth of two small streams hich connect at the settlement of Tiran, about 6 cables above the ntrance.

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a depth of 9 feet at high water springs, marked by beacons on either side. The outermost beacon lies in 11 feet water N. ¼ E. distant $1\frac{4}{10}$ miles from the light.

On the eastern side of the channel the shore bank dries off about 8 cables. Fishing stakes will be found in depths of 4 fathoms off here.

LIGHT.—On the west side of the entrance, from a white support, is exhibited a *fixed white* light, visible from a distance of 10 miles in clear weather.

Tides.—It is high water, full and change at 3h.; springs rise 7 to 8 feet. *See* also remarks on tides, p. 28.

Settlement.—Tiran is chiefly inhabited by Chinese. It has a Custom House, and there is regular communication with Penang and some traffic by small coasting steamers.

The controller of the district lives a short distance inland, at Labuan Ruku, which place is connected by a good road with Bedagei and Asahan.

Tanjong Timbun Tulang.—Between Batu Bara river and Timbun Tulang, 10 miles to the eastward, the sandy beach forming the coast is here and there interrupted by mud and mangroves, the whole backed by trees of uniform height. Some unimportant streams discharge here, amongst which are the Bagan Batak, 6 miles eastward of Batu Bara, and the Timbung Tulang at half a mile westward of the point of that name. Their mouths dry at low water. Only at the mouth of the latter is there a small fishing village, and it is visible from seaward from about 10 miles and serves to distinguish the point. Its shore bank dries off nearly half a mile on an average; 2 cables off Timbung Tulang is a sand bank which only covers at high water.

Shallow water extends about 4 miles northward of Timbung Tulang, at which distance there is a ridge with from 3 to 6 feet water, over hard sand and mud, and steep-to, necessitating caution when approaching it. Salanana bearing N.W. leads one mile northward of it. Coasting craft at times pass within it, there being 6 feet at low water. From Timbung Tulang to Asahan river the coast is chiefly mud and mangroves, is uninhabited, and fronted by a bank which dries off about half a mile.

See chart, No. 794.

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ne Silau Latu creek discharges at about one mile eastward of bung Tulang.

UNGI ASAHAN.—The channel over the bank fronting the e of the entrance to Sungi Asahan, has a minimum depth of et at low water springs, and about 14 feet at high water springs, a bottom of hard sand. The position of this bar is 2 miles hward of the entrance points. In the river, abreast the light, it one mile above the entrance, there is a bar with about 15 feet at water, and 5½ miles above it and one mile below the settlement, e is a bar with 14 feet at high water. The general low water ths in the river are from one to 3 fathoms. The entrance is half ile wide, between low mangrove points.

Buoyage.—The channel is buoyed and fairly straight in a N. by E. S. by W. direction. To mark the approach, a beacon buoy with is placed in 3½ fathoms, at 5 miles North of Napal point. The nnel is marked by white buoys on the starboard hand and black ys on the port hand, the outer pair lying 3½ miles N. by E. of the rance, and the inner ones about 2 miles above the entrance.

IGHT.—At the north end of the fishing village, situated one mile ve Tanjong Napal, is exhibited from a white support a *fixed white* t, visible between the bearings of S. 4° W. and S. 62° W. from a ance of about 6 miles.

umpul bank.—Fishing stakes.—The bank fronting Tanjong pul, the east point of entrance to Sungi Asahan, dries off about iles, and the depths over Jumpul bank, which extends 6 miles hward and north-eastward of the point, vary from 3 feet to thoms, with spots dry in places. It is steep-to on its north-eastern .

Vestward of Tanjong Napal the shore bank dries off about one mile. nerous large fishing enclosures exist on these banks, and in places e to the buoyed channel of the river. The bottom consists chiefly ud, mixed with sand and shells.

irections.—Coming from the westward, Salanana should be bearing N.W., astern, to pass northward of Timbun Tulang k, until the fishing huts on the point of that name bear . ½ W.; when the outer beacon buoy should be steered for, about

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From this buoy the course is about S.S.E. 2 miles, to the outer pair of channel buoys; thence about S. by W., between the buoys on either side. Abreast the light is the first inner bar; the two beacons with white triangles, southward of the fishing village, in line bearing S.E. by S., lead over in mid-channel. It is not advisable to offer directions above this. A man acquainted with the river can possibly be obtained from the fishing village (Bagan) abreast.

Coming from the eastward, Tanjong Timbun Tulang should be kept westward of W. by N. which leads northward of Jumpul bank, until the beacon buoy, or the mouth of the river bears about South, when the buoy may be steered for; thence proceed as before. Coasting craft at times venture in at night, but as the limit of the light from the deck is nearly 2 miles within the edge of Jumpul bank, it is not to be recommended.

Tides.—It is high water, full and change, on the outer bar at 3h. 30m.; springs rise from 10 to 12 feet; at the settlement it is 4h.; springs rise about 8 feet. Outside the bar the flood runs from S.E. to S.S.E. at the rate of 1½ knots, and the ebb N.N.W. and more northerly. *See* the turn of the streams, p. 89. In the river channel the streams set fairly straight, the ebb at times running at the rate of 3 knots.

Settlement.—Telegraph.—Balei, the settlement, is situated about 7 miles above the mouth of the Asahan, at the junction of that river with the Silau. The river here is about 90 yards wide, with low water depths of 10 to 15 feet, but it is very shallow just above.

There is an iron pier for coasting craft to lie alongside.

Balei is the chief town of the district of Asahan. The Controller resides here.

There is a post and telegraph station, and a considerable traffic by coasting steamers and other craft with other ports. *See* Communication, p. 9.

COAST.—From Jumpul, the east point of entrance to Sungi Asahan, the coast trends south-eastward 8 miles to Tanjong Si Api-api, whence it forms a shallow bay 20 miles wide between that point and Tanjong Pertandangan; here it turns sharply southward to Penipahan. Into this bay, formerly known as Ledung bay, the rivers Kwalu and Panei discharge their waters, the deposits from which have formed Panei bank, extending 10 miles off shore, and

See chart, No. 794.

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ıe 4 miles seaward of the line forming the points of the bay. ge portions of it are dry at low water and numerous fishing losures are erected on it; being steep-to on its eastern side it uld be approached with caution. There are no other streams of importance.

The bank fronting the shore dries off about 2½ miles from Api-api, and from a half to 2 miles in other places. Outside the ɔth of 5 fathoms the depth increases suddenly; within that ɔth the water is usually discoloured, especially off the mouths of streams. The bottom is mud and sand and shells.

Anchorage may be taken almost anywhere.

The coast is low and in most places fronted by mangroves, similar that described on p. 84, affording but few objects for identifying There are a few fishing huts about. The tree within Bangsi, at e mouth of the Panei, and the village at Mendulang are conspicuous jects. Inland some 40 miles the ranges of mountains are visible clear weather.

Ludam.—The point and fishing station named Ludam is situated ɔut six miles eastward of Sungi Asahan. Some rather tall trees near the point. Between are the streams Ular, Betul, Undan, d Sarong Alang; the latter is the largest, and half an hour up eam lies a settlement where fruit and poultry are obtainable.

Between Ludam and Si Api-api lies the Sembilan stream. It y be known by the white beach and fishing huts at its mouth.

Tanjong Si Api-api is a sharp well defined point overgrown th mangrove trees of moderate height. The Si Api-api discharges re, and is marked by two huts at its mouth and a white beach ıthward of it.

Ledung.—From Si Api-api the mangrove coast trends southward nearly 12 miles to Ledung river and village, situated on the west e of entrance to the Kwalu; it is fronted by a bank, which ıthward of Si Api-api dries 2½ miles off.

A native collector of taxes resides at Ledung village, on the south e of entrance to the Ledung. A depression in the line of trees rks the neighbourhood of the river.

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About midway between Si Api-api and Ledung is the Chinese fishing

name, where there is a little white beach. The village is visible from a considerable distance in the offing and therefore a useful mark. Elsewhere there is only an occasional hut at the mouths of the several unimportant creeks on this coast.

SUNGI KWALU.—The mouth of this river abreast Ledung is 2½ miles wide, but it quickly narrows to less than one mile at the first bend, and within it is narrow and somewhat tortuous. The channel is not buoyed.

The bar, with a depth of 6 feet at low water springs and 18 feet at high water springs, lies midway between Ledung and Si Babi, near the western shore. Coming from the north-westward, Tanjong Ledung should be kept well open of Si Babi, to avoid the bank which is steep-to, southward of Si Api-api. From abreast Si Babi, distant about 3 cables, steer to pass about the same distance off Ledung across the bar, avoiding the fishing stakes. Abreast Ledung there are depths of 12 to 15 feet. The river has not been examined above this. Steam launches and small trading craft only visit it at present.

From the eastward, the course is northward of Panei outer buoy.

SUNGI PANEI.—The mouth of the Panei is about 3 miles wide between the low mangrove points of Datu and Bangsi forming its entrance. Ten miles above it is reduced to about two-thirds of a mile, where it is joined from the westward by the Bila. Labuan Bilik the settlement is situated about 2 miles above the junction, on the eastern bank of the Panei. The least depth between the sea and the settlement is 18 feet at high water springs, abreast Njiri Kechil, 4 miles above the west point of entrance.

Channels.—The mudbank fronting the mouth, with depths of one to 3 fathoms, extends about 12 miles northward of the entrance; its outer part is known as Panei bank. Large portions of it dry at low water, that known as the Middle bank being about 5 miles in length; it and the bank westward of it are steep-to, and dry 6 feet. Between the banks which dry, there are four channels into the river; that close westward of the Middle bank is known as the Panei channel and is buoyed.

The Panei has a low water depth of 11 feet, springs rise 13 feet; there is but little better water anywhere in it, and this depth is not carried above Datu, the west point of the entrance.

See chart, No. 794.

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e western channel has a least depth of 6 feet, situated between pat and Datu, but is easily navigated; the banks on both sides teep-to.

ie Bangsi and East channel connect abreast Bangsi, 1½ miles e which there is a bar with 3 to 4 feet water only; coasting use them occasionally.

uoyage.—The outer buoy of Panei channel lies on the edge of 3 fathoms contour line, and is a beacon buoy with ball, from ch the east side of the mouth of the Panei bears S. ½ W. and t Si Api-api N.W. by W. ¾ W. About 1½ miles within it are the r pair of channel buoys, one mile apart; there are several buoys each side (white to starboard and black to port) marking the nnel as far as Berombang, about 4 miles above the entrance. re are several fishing enclosures on the banks on either side.

irections.—The entrance may be identified from the offing by high tree at Bangsi, 207 feet in height, by the fishing huts at dulang, and the prominent point of Si Api-api. Having made beacon buoy, the course through Panei channel is about S. by W. veen the buoys on either side in not less than 23 feet at high water ngs. From abreast Datu, the west point of entrance, the track long the western shore avoiding the fishing stakes, until the thernmost of the two conspicuous trees at Berombang (has a nd top) bears S.E. Then steer direct for the southernmost tree, ssing the bar in a depth of 18 feet at high water springs; when hin 3 cables of the eastern shore steer along it, passing within f a cable or less of Lumut village. Here the channel is narrow, buoyed, and the banks westward of the track are steep-to. Off mba Lumba, the turning point of the river, there is a low water th of 4 fathoms, whence to the settlement the northern bank st be kept. Off the settlement there are low water depths of 2¼ fathoms. The tidal streams are strong.

There is some 3 or 4 feet better water westward of the fairway nks, which dry about 6 feet off Lumut, but it is apparently not so y to navigate.

Tides.—It is high water full and change off the entrance at 30m.; springs rise 12 to 13 feet; and at Labuan Bilik 4h. 30m.; ings rise 14 feet; *see* the remarks on the tides, on p. 28. e streams run for six hours each in the entrance, but as the

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settlement is reached the flood runs for 4 hours only and the ebb for 8 hours. The flood or south-east stream off the entrance makes at about 5 hours before high water, and attains a velocity of 2¼ knots, the ebb running 3¼ knots. Between the entrance points they run 3 and 4 knots, respectively; off Lumut and Lumba Lumba both flood and ebb attain a rate of 4 to 4½ knots at springs; near the shore between these places there is a counter stream during the first of the flood. There is no slack water at springs.

Anchorage.—The usual anchorage is near the mole of the Collector of Customs just below the settlement, where, very close in shore, there are depths of 12 to 15 feet. Vessels of that draught would have to moor head and stern.

Settlements.—The shores of the river are mangrove up to Berombang, and in the bight northward of Berombang Tungal, as well as south-eastward of that point, and the island Kantan abreast of Labuan Bilik. The remainder of the banks of the river are firm ground overgrown with tall trees, and steep-to. Cocoa-nut trees are growing on either side of the many little villages on the banks.

The Settlement of Labuan Bilik has a population partly Malay, partly Chinese, chiefly occupied in the fisheries.

The Prince of Panei resides not far above the Settlement.

Labuan Batu, on the same bank, about 31 miles above Labuan Bilik, is the residence of the Controller. It is stated to be high water, full and change at this place, at 7h. 30m., and the springs to rise about 10 feet.

Communication.—Trade.—The coastal mail steamers of the Netherlands India Service call here, *see* p. 9. Small steamers and other coasting craft carry on the trade with other parts of Sumatra and Penang, &c.

Sungi Bila, which joins the Panei below Labuan Bilik, has a depth of 4 feet at low water springs in the channel between the bank fronting Berombang Tungal and the bank in the centre of its mouth; 200 yards off the wharf of the Collector of Customs at Si Jawi Jawi, the settlement 2 miles up, the depth in the river is 7 feet.

See chart, No. 794.

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irection more from south than west. Hard squalls from S.E. ain were frequent. Rain occurred in all months, but chiefly August to November.

AST.—The coast between Bangsi at the mouth of the Panei, Pertandangan about 5 miles to the eastward, consists of mud d with mangroves, similar to the coast westward of the Panei. en are the small streams Bakau and Luwus at the mouths of are a couple of fishermen's huts. Within is the conspicuous 07 feet in height, before referred to.

jong Pertandangan is a low mangrove point but well d when seen from north-westward or south-eastward.

nk.—The shore bank dries off 2 miles north-eastward from it, om thence to near Pechudian nearly 12 miles south-eastward ess than a mile; off Pechudian it again extends about 2 miles. the latter point, a bank with from 1½ to 3 fathoms extends 10 miles northward, nearly parallel to the coast, and may be ached by the lead, but off Pechudian it is somewhat steep-to, hould not be approached under 7 fathoms.

okan.—From Pertandangan to the village of Sitokan Kechil, ore is all mangrove with the exception of a low water shelly just southward of Pertandangan and a similar beach between nall streams, Pertandangan, and Keluang.

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Sitokan Kechil village lies 1½ miles southward of the Sitokan, and is visible from the offing. Southward of it as far as the Tawar stream, tall trees stand close to the coast.

Tanjong Pechudian is fringed with mangroves; the tall trees backing this coast decrease suddenly in height near it, owing to which it may be distinguished from some distance. The shore bank extends 2 miles off the point.

Two small streams of the same name discharge southward of the point; there are fishing huts at their mouths and a little shelly beach. Southward of the streams the shore is again mangrove.

Penipahan.—The village, point and stream of this name lies 4 miles southward of Pechudian. The village, consisting of about 40 huts and some 100 Chinese fishermen, is visible from a considerable distance in the offing. The coast mudbank dries off nearly 2 miles between Pechudian and this village, decreasing rapidly towards the latter where it extends half a mile only, and is composed chiefly of sand and shells.

SUNGI ROKAN APPROACH.—Coast.—From Penipahan the coast chiefly composed of mangroves continues its south-easterly direction to the estuary of the Rokan, in which are situated the Halang islets. Several small streams discharge on the coast, but there are no points of recognition beyond the fishing huts at the mouths of the Ular, Tengah, Pasir Limau Kapas, and Andam.

Some cocoa-nut trees, the only ones on this coast, point out the position of Pasir Limau Kapas and are possibly a useful mark when approaching the Rokan from the westward.

Halang islets are formed simply by the growth of the mangroves on the mudbanks filling Rokan estuary; banks dry at low water, extend about 4 miles south-eastward of them. The northern one, formerly known as great Halang is now only about half the length of that known as little Halang.

Kubu.—About 5 miles up the Kubu, a small stream on the coast abreast of the inner Halang, is the settlement of Telok Merban.

Bank.—Southward of Penipahan, the shore bank dries off only about 3 cables, and the 3 and 5 fathoms contour lines which run close together are about 2 miles off shore until about 2 miles

See chart, No. 794.

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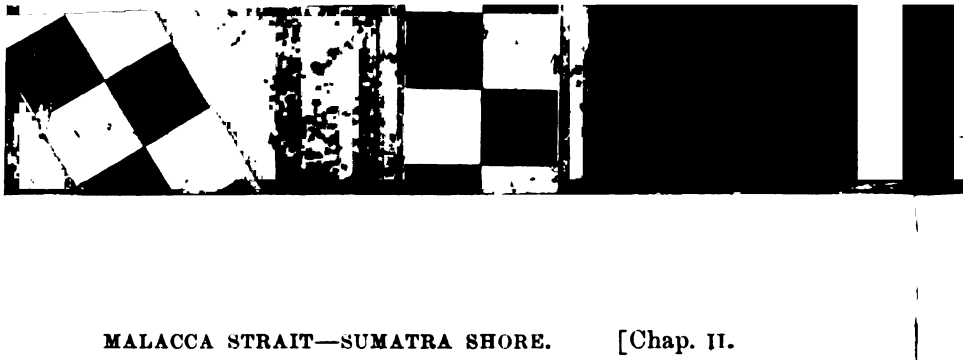

vard of Hantu, where a bank 2 miles in length and 1½ miles off dries at low water; southward of this the water gradually to the river.

thward of the peninsula forming the eastern side of the river, udbank with depths of one to 3 fathoms, extends about 25 miles westward, and the 5-fathoms limit some 5 miles beyond, to 1 7 miles of the southern Aroa islands.

hin the 3-fathoms line there are numerous fishing enclosures, iere are many fishing stakes covered at high water.

shore mudbank northward of Senebui and Raja Berjamu ns, on the eastern side of approach to the river, dries off about les. Senebui island is formed by mangroves growing on the ank, and there is a narrow passage within it. There is a fishing village up the Berjamu stream, which is three-quarters able wide in the entrance.

ngi Rokan is about 5 miles wide in its entrance between Si Api-api, the principal settlement, and the western shore. educed to 2½ miles abreast Labuan Tengah, some 9 miles above less than one mile at Beting, 20 miles above. The shores on sides are composed of mud and mangroves, and intersected by small streams.

river itself is much encumbered with banks, mostly quick-, and the channels between them are constantly shifting, ring navigation somewhat difficult.

pths.—Directions.—The approach to the river is not d, but the depth in over the flat seems pretty much the same where.

m the northward approach the mudbank fronting the river by ead, bringing Tanjong Belanda, the slight projection of the northward of the settlement of Bagan Si Api-api, to bear just ard of South, when in sight, and steer for it. From the oms contour line, the point being distant about 10 miles, a course d be shaped to pass 2 miles westward of that point, which will n over the flats in about 23 feet at high water springs (6 feet w water springs). When abreast the south end of Bagan i-api, haul in for it.

m the westward, having passed about 4 miles off Pechudian enipahan, course may be shaped to pass about 4 miles north-

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Anchorage.—There is a depth of 11 feet at low water springs between a half and three-quarters of a mile off the flagstaff at Si Api-api ; for vessels requiring more water, a depth of 20 feet will be found from 1½ miles to about 4 miles south-eastward of the settlement. The depth is apparently not above one fathom a little higher up.

Tides.—Bore.—It is high water, full and change, at the town of Si Api-api, at 5h., springs rise 17 feet, neaps about 12 feet ; and there are two high waters in the 24 hours. From 2 or 3 days before until 5 or 6 days after springs, the tidal rise is within a few inches of that at springs, as stated on p. 28. The flood runs for 4 hours and the ebb for 8 hours, at the rate of 5 knots at springs, at which time there is no slack water. The flood stream is weak during neaps.

From 3 days before until 3 days after full and change, the flood makes as a bore some 3 feet in height and with great noise and speed, a considerable danger to small trading craft and boats ; these usually wait under Labuan Tengah until the bore has passed up. Below Labuan Tengah it is not noticeable beyond a sudden rising of the water and a strong stream.

On the mud flat off the Rokan, during springs, the tidal streams revolve against the hands of a watch ; the maximum strength of the streams is from 3 to 4 miles. In the offing the stream runs south-eastward from 2 to 3 hours before to 2 to 3 hours after high water by the shore. During neaps a north stream and a south stream are noticeable, of which the first named is the stronger and runs the longer, and two days after the quartering of the moon it is very frequently the only stream.

Winds.—Near and eastward of the Rokan, the winds during the survey were very variable ; in April and in November and December there was much north-west wind, with rain, whilst in July and August the winds for the greater part were between E.S.E. and N.E. Sumatras were experienced, causing a nasty sea, but soon over. In July, during four successive days a strong south-east wind was experienced. Rain fell in every month, the most in April.

Settlement.—The town of Bagan Si Api-api fronts the eastern shore of the estuary of the Rokan, for a distance of 1½ miles. It takes its name from the quantity of wood for fuel (api-api) which can be obtained there.

See chart, No. 794.

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e inhabitants, about 3,000 in number, are nearly all Chinese, ged in the fisheries.

e trade in dried shrimps and fish is carried on by small steam ls running regularly between this place and Singapore, *viâ* kalis.

Controller resides here, as the head of the civil government.

e settlement of Labuan Tengah is 9 miles above and that of h Putih about 33 miles above Si Api-api, the last mentioned e western bank. A native revenue officer resides there.

)AST.—Tanjong Senebui is the north-east extreme of the ısula separating Sungi Rokan from Salat Rupat, from whence oast trends south-eastward forming the west side of approach to strait. The whole of it from Raja Berjamu to Ketam is ɔrmly low and thickly wooded, overgrown with mangrove, the palm and low brushwood. Behind the border of trees it is ss and entirely without inhabitants. Only near and westward enebui are signs of life apparent, owing to the fishermen from Rokan pursuing their calling here.

njong Senebui is fairly steep-to, but to the south-eastward een it and Ketam, the shore mudbank dries from one to 3 cables nore.

ffing banks.—In the offing between this shore and the fairway alacca strait, there are several mudbanks some of which dry at water; they are the continuation south-eastward of the South s, as far as and southward of Pyramid shoal; there is no gable channel between them, but there is one along the Sumatra e used by trading craft. The positions of these banks will be understood by referring to the chart. Some of them break at s.

e bottom is pretty hard, and consists of sand, with here and a layer of mud; the banks are all steep-to, with depths between as much as 30 fathoms in places.

ıkal Tua bank, within a depth of 3 fathoms, is 7 miles in h, and steep-to on all sides; it lies parallel and one mile distant the shore on the western side of entrance to Salat Rupat. Two on it dry at low water. Between it and the main is the best nel to the strait; the least water, 3¼ fathoms, is over the bar

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Anchorage.—There is good anchorage in from 6 to 12 fathoms, sand and mud, along the whole of the western shore of the entrance of Salat Rupat.

SALAT RUPAT is the strait about 2 miles wide separating pulo Rupat from the coast of Sumatra; it and its continuation south-eastward within pulo Bengkalis and through Salat Padang affords a quiet channel for steam coasting craft trading between Singapore and the extensive fishing stations in Sungi Rokan.

Depths.—Directions.—Salat Rupat has low water depths of above 5 fathoms in some of the channels between the banks in it and at both entrances, but none are buoyed.

The channel used by coasting craft is along the Sumatra coast for the whole distance, from Tanjong Senebui in the western approach to Tanjong Lebang in the eastern entrance, westward of all the islands. It has a least depth of $3\frac{1}{4}$ to $3\frac{1}{2}$ fathoms at low water springs in two places, namely, on the bar which nearly connects Bakal Tua bank with the coast off the west point of the west entrance, and a similar bar which connects the south end of pulo Ketam with the same shore. Thence to Brewer strait the water is deep; the channel, with about 12 fathoms, is between Tanjong Lebang and the shoal, about 8 miles in length, with $1\frac{1}{4}$ fathoms least water, lying between it and Tanjong Jati.

Salat Padang, p. 109, leading eastward from Brewer strait, has not less than 5 fathoms in the fairway.

The channel to seaward, north-eastward of Tanjong Lebang and of the bank of $1\frac{1}{4}$ fathoms referred to, and southward of an isolated shoal of $2\frac{1}{2}$ fathoms outside the coast bank of pulo Rupat, has a least depth of 4 fathoms. Two patches with about one fathom least water, lie about one mile off the north shore between Tanjong Tegoh and Kampong Batu Panjang; and a patch of $3\frac{3}{4}$ fathoms half a mile off the south shore a little westward of Kampong Puah, but the channel is $1\frac{1}{2}$ miles wide between them.

Within the depth of 5 fathoms the shore banks are mostly steep-to. The bottom is chiefly mud and sand, with hard clay in places; anchorage may be taken everywhere.

The strait should only be navigated with local knowledge.

Tides.—It is high water full and change in the west entrance of Salat Rupat at about 5h. 45m., southward of the island at about 6h., and at Tanjong Lebang in the east entrance at about half-an-hour

See chart, No. 795.

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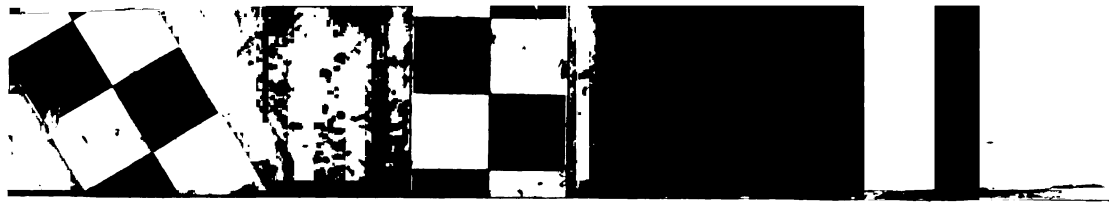

'; springs rise about 12 feet in the west entrance and from 8 to
:t in the eastern entrance, with a velocity at springs of 2 knots
ide. In the strait, the flood or south-eastern stream runs at the
of 2 knots from about 2 hours before to about 2½ hours after
water, and the ebb or north-western stream at the rate of
ots, for the remainder of the 12 hours.

spect.—Settlement.—The whole of the south shore of Salat
at is thickly wooded and there are no streams of any importance.
Sungi Dumai is the largest; its mouth is dry at low water, but
e are depths of one to 2 fathoms within.

ne population is very scanty. At 12 miles westward of Tanjong
ang is Kampong Puah, situated in the space where the timber
been removed by burning and felling; it is visible from the
t. The Kampongs of Pulai Bongkok and Dumai farther
ward are not visible from the strait. Southward of Tanjong
ang are a couple of houses. With the exception of a somewhat
picuous tree 4 miles westward of Tanjong Lebang, there are no
ceable marks on this coast.

ne coast of pulo Rupat, north side of the strait, from its north-
extreme to as far as Tanjong Masim is covered with low trees
brushwood and is inundated at high water; within on the
nland are tall trees with which the entire island (chiefly marsh)
mpletely overgrown.

anjong Tegoh is a shelving point; Lembu to the westward is
ked by tall trees rising close to its extreme.

7 miles westward of Tanjong Tegoh lies the Kampong Batu
ang, the small houses of which are conspicuous. Elsewhere the
is uninhabited, but here and there a few huts may be seen,
h form the temporary dwelling place of a few Chinese or
ys who come here to cut timber. The small streams are of no
rtance. The islands are all covered with tall trees.

rade.—There is but little traffic through Salat Rupat. Some
small coasting steamers use the strait, trading between
apore and Bagan Si Api-api in Sungi Rokan, as before stated,
Bengkalis and Siak; occasionally sailing craft come here to cut
carry away timber.

ULO RUPAT, and PULO MEDANG lying northward of

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cable wide, with depths of 5 fathoms and more, but it is of no importance to navigation; its eastern entrance has a low water depth of 6 feet, and its western entrance 3 feet over a flat one mile wide. Both shores are thickly overgrown, and there are no inhabitants. The two islands form a circle about 26 miles in diameter; the greater portion of them is morass with mangrove shores and tall trees within, the tops of which are visible from a distance of about 16 miles. Pulo Rupat, with the exception of its north-west extreme, has been described with Salat Rupat.

Nion river discharges on the north-west side of pulo Rupat, and has a depth of 2 fathoms in its entrance, but it is blocked by a bank upon which the depth is only from 2 to 3 feet. Between the river and Tanjong Mambol, at the entrance to Salat Rupat, the coast is overgrown with trees to the high water line.

Pulo Medang.—Settlements.—The greater portion of Medang is low and wooded close down to the shore, chiefly mangrove; on the north-eastern shore there are small sandy beaches and casuarina trees in places, on which are the small kampongs named Batu Mamung, at 3 miles northward of Salat Morong, inhabited chiefly by Chinese; further north-westward are the kampongs Kuku-Burung and Makerau, and there is a hut on Tanjong Punah. Off the north-west coast there are small fishing settlements on the Burung and Simpur islets.

The north-east coast is clear of dangers beyond one mile, with the exception of the bank, nearly dry at low water, which extends about 1¾ miles off shore between Makerau besar and Tanjong Punah. The banks north-westward of the island will be best understood by referring to the chart, as stated on p. 104.

Tides.—Off pulo Medang, it is high water, full and change, at 6h.; springs rise 8 feet. The south-eastern stream runs at the rate of 2 knots, and the north-western about 3 knots; at neaps there is little or no south-eastern or flood stream appreciable. At Tanjong Jati, east side of entrance to Brewer strait, it is high water, full and change, at 7h. 15m., and at Bengkalis at about an hour later; springs rise about 8 feet; the flood or south-eastern stream runs at the rate of 1½ knots, and the ebb at about 2 knots. (*See also* pp. 105, 106.)

BREWER STRAIT, seaward approach.—The approach from the northward to Brewer strait and Siak river, although

See chart, No. 795.

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uoyed, presents no great difficulty to vessels of and under about-
feet draught. The entrance, between pulo Rupat and pulo
gkalis, is 18 miles wide, and between the banks extending from
n those islands there is a channel 3 miles wide with depths of
16 fathoms, and over a breadth of about 6 miles there is not less
n 2½ to 3 fathoms at low water.

Banks.—From abreast Salat Morong, the coast bank, with depths
to 3 fathoms, takes a general S. by E. direction, its south extreme
g about 7 miles E. by S. of Masim, whence it turns directly
tward for Tanjong Tegoh. Southward of it, with a narrow
nnel with 4 fathoms water between, is the bank, 8 miles in length,
n a least depth of 1¼ fathoms, lying parallel to the coast eastward
Tanjong Lebang, referred to on p. 105. About 5 miles N.W. of
jong Jati, the east point of entrance, are two patches, of 2¼ and
athoms.

bank with depths of 3¼ to 4 fathoms, extends about 15 miles
th-north-westward of Tanjong Jati, the east point of entrance;
patches on that bank, with depths of 2¼ and 2½ fathoms, lie near
channel edge at about 5 miles north-west of the point, and a
h of 3 fathoms lies about half a mile south-west of Jati;
re are no other shallow parts charted.

Coast.—The western shore of the approach, on which there is but
e noticeable southward of Salat Morong, is described on p. 106.
eastern side is formed by Tanjong Jati and the north coast of
Bengkalis. This coast is also of uniform appearance, and
pletely covered with trees and brushwood. About midway
ween Jati and Tanjong Parit lies the kampong Tengah; with
exception, the coast is uninhabited, but for a couple of weeks
the months of May and November, the great fishing seasons,
re may be as many as five or six hundred small craft engaged
e in fishing. A bank, with 2¼ fathoms, lies 2½ miles off the west
of kampong Tengah, and one of 2½ fathoms lies about 6½ miles
the same point. Another with 2½ fathoms lies about 4½ miles off
re between that village and Tanjong Jati. These ridges all run
llel to the shore, and present no dangers to small craft.

Directions.—The approach from the westward is along the
th-east coast of pulo Medang, off which there are depths of 18 to
athoms beyond the distance of one mile. From the eastward, pass

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vessel would approach Siak river from that direction *viâ* Salat Padang. From a position about 2 or 3 miles off the village of Batu Mamong on pulo Medang, a S.S.E. course for about 10 miles, allowing for the tidal stream, should be steered, checking the position by bearings of Tanjong Masim and the village referred to; thence about S.S.E. until Tanjong Jati is sighted, whence course may be shaped to pass between the 2½ fathom patch off it and the bank with 1¼ fathoms on the western side of the channel; thence the water is deep throughout Brewer strait. (*See* Tides, p. 107.)

Brewer strait, about 3½ miles wide, is that portion of the inshore channel between Tanjong Lebang, the east point of entrance to Salat Rupat, and the west extreme of pulo Padang, and is deep throughout. The continuations eastward of Brewers strait are Salat Padang and Salat Panjang.

Settlements.—On the north side of Brewer strait is the settlement of Bengkalis, where the Civil (Dutch) governor resides.

Anchorage.—Light.—At Bengkalis is a mole about 400 feet in length, from the extremity of which a *fixed red* light is exhibited. At from one to 1½ cables off it there is good anchorage, in from 5 to 6 fathoms.

Communication.—The coastal mail steamers call here every fortnight. (*See* p. 9.)

Coal.—There is a small Government coal depôt here.

Bukit Batu is a village built on piles, situated on the Sumatra shore of Brewer strait, at the mouth of a small river of the same name, and nearly abreast Bengkalis.

There is anchorage abreast of the river in 12 fathoms, with the town bearing W.S.W. and Tanjong Jati bearing N. by W. ½ W.

Salat Padang, the northern channel leading eastward from Brewer strait, is that used by small craft trading between Singapore and Sungi Rokan. It is not less than 6 cables in breadth, with depths of 5 to 8 fathoms in the fairway throughout, and in most places there is a depth of 3 fathoms close to the shores, which are thickly wooded.

See chart, No. 795.

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ıl ground, nearly dry in places at low water, extends about
les off Padang, the south point of the west entrance.

lap is a small island on the south side of the strait; the deep-
ıel is northward of it, but there is a depth of 4¼ fathoms south-
of it. (*See* Tides, p. 107.)

lat Panjang, or Long strait, is the southern continuation of
nshore channel eastward from Brewer strait. It is from
2½ miles in breadth, with fairway depths of 8 to 13 fathoms as
the junction of Salat Asam; but a bank about 5 miles in length
a least depth of 5¾ fathoms lies in the fairway abreast Makapan
ment. The water is apparently deep as far as pulo Panjang.
he east entrance has a charted depth of about 2 fathoms only;
ng is known of this portion beyond what is shown on the chart.
Tides, p. 107.)

e Siak river discharges into this strait.

ttlements.—Southward of the Siak, are the settlements of
ng and Makapan, and on pulo Padang, those of Dingkel, Gambar,
Majung. Small wharves exist on both sides and here small
ship their timber. Both sides of the strait are covered with
rees. On the Rawa river there are saw mills.; this river has a
ı of 5 feet on its bar at low water, with 3 fathoms in the river
n.

AK RIVER enters Salat Panjang at about 8 miles southward
ınjong Balei. The river is about half a mile wide at its entrance,
ont of which, at the distance of 8 cables north of Liang point,
ast side of the entrance, is a bar, three-quarters of a cable wide,
a depth at low water springs of 15 feet (springs rise 8 feet), and
but little less depth for some distance on either side of that
lth. The depths within are considerable, so that all vessels
h can cross the bar can reach Siak, 39 miles above the mouth,
some 40 or 50 miles beyond. Including boat navigation its
gable course has been estimated at 150 miles.

e depths in the channels from Malacca strait are also greater than
on the bar. The best approach is eastward of pulo Medang,
rewer strait northern approach, pp. 107, 108.

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Directions.—Proceed across the bar with the conspicuous tree on the western bank just within the entrance, bearing S.S.W. ½ W.; when the inner coast of the east point bears S. ½ E., steer about South until abreast the eastern point; then keep close along this shore, where there are low water depths of 3½ to 4 fathoms as far as the eastern point of Gunting island; here the depths over the whole river increase to 4½ and 5 fathoms; pass on either side of Tengah island (situated about 5 miles above the mouth). Up to the second bend above Tengah keep the western side to avoid a bank on the opposite shore; above this the depths are from 5 to 15 fathoms, the lesser depth being close to the shore, but it is advisable to follow the bends and avoid the points as in most river navigation.

In several places the river banks are about 6 feet above high water, but within them the land is marshy; both shores are wooded. Upon the eastern bank are two small villages.

Siak.—Near Siak the river has a breadth of one cable with depths of 11 to 12 fathoms.

Pier light.—There is a wooden pier at the lower end of the town abreast the flagstaff of the Controller, with a depth of 2 fathoms alongside at low water. By night a *fixed red* light is shown from it. A Controller is stationed at Siak and there is a Dutch military station here. The Sultan resides on the opposite shore.

Communication.—The coastal mail steamer calls fortnightly (*See* p. 9.)

Shipping.—20 vessels entered and cleared in 1894, namely, 5 from Singapore and 15 from Malacca.

Pakan Baru.—Trade.—From Siak to Pakan Baru, about 40 or 50 miles above, the river gradually narrows to about 90 yards, with depths of 5 to 6 fathoms, and no hindrances to navigation. This place is the staple town of the forest products, and most of the trading vessels entering Siak river load here.

Tides.—At the mouth of Siak river it is high water, full and change, at 8h. 45m.; springs rise 9 feet, and neaps 5 feet. Off the town of Siak the spring rise is 10 feet. The flood stream runs at the rate of about 2 knots at times; probably the ebb stream exceeds this.

Lesser channels.—Salat Ringit is the passage leading out from Salat Panjang, between pulo Padang and pulo Rantau, southward of

See charts, Nos. 795 and 1,355.

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Mérbau. It is stated to have from 4 to 6 fathoms water. Salat leads from Salat Ringit, westward of pulo Mérbau.

at Ayer Itam is the continuation of Salat Ringit along the north of pulo Rantau, and between that island and pulo Rangsang. It ut one mile wide, but the depth is not known.

mpore river, situated in the bight southward of the east entrance ewer strait, is fronted by an extensive mud flat, almost dry at vater. It is little frequented on account of its rapid tidal streams oore, but little is known of it and it does not appear on the s.

ution.—The space between Bengkalis and pulo Rangsang, into n debouch Salats Padang, Asam, Ringit, and Ayer Itam; also een pulo Rangsang and the islands of Great Karímon and pulo n, and the Salats Sabong and Mendol south-westward of Great non are fronted by extensive mudbanks, and sandbanks, the ons of which have not been accurately determined. It can only vigated by those locally acquainted.

EAT KARÍMON ISLAND is 11 miles in length in a and south direction; near its north end are two peaked hills, feet, and 1,474 feet high; the remainder of the island is pally low barren land. Its southern end is separated from g island by Gelam strait, 2½ miles wide; and its east side, as far as Two-tree point, is fronted by a shallow mudbank, which ls 1½ miles off.

east Two-tree point a bank having a depth of 2¾ to 4½ fathoms ls 6 miles in a S.E. by S. direction, with its outer edge distant les from the island.

tle Karímon separated from the north-east end of Great on island by a deep channel half a mile wide, is a high bold 2½ miles in length, with two peaks covered with trees, the rn being 1,067 feet, and the southern 1,026 feet high. The east side is steep-to, but from its south point a spit extends es south-eastward, with a least depth of 3¾ fathoms.

horage.—There is good anchorage south-eastward of Little on island, during the south-west monsoon.

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The Brothers are round islets, the two outermost of which lie near each other about 2½ miles north-westward of Little Karímon. Southward of the Brothers, and one mile from Great Karímon, is White rock, above water. Seal rock, surrounded by foul ground, lies about 2½ miles westward of White rock.

Southward of Seal rock are several islets; these and the west coast of Great Karímon have not yet been surveyed.

The north side of Malacca strait and its northern approaches will now be described.

See chart, No. 2,403.

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CHAPTER III.

LACCA STRAIT AND ITS NORTHERN APPROACH (*continued*).—MALAY OR EASTERN SHORE.

VARIATION IN 1896.

Malacca strait ... ... $2\frac{1}{2}°$ E.

eneral Remarks.—This chapter treats of the eastern shore of acca strait from Junkseylon, to Tanjong Bulus, in the western oach to Singapore. General remarks on winds, weather, &c., directions for navigating Malacca strait, will be found in ter I.

JONG SALANG or Junkseylon island, part of the dom of Siam, is separated from the Malay peninsula by Papra Pak-Phra) strait, and lies between lat. 8° 10′ N. and 7° 46′ N.; about 24 miles in length, 9 miles in breadth, and divided into Raja-ships of about equal size; the northern being named ng, and the southern Puket. The population of Junkseylon, posed of Malays, Chinese, and Siamese, is about 33,000. The cipal towns are Bandon, Tongka, Katha, and Tharúa the old al. The north shore of Papra strait is under the Raja of iatung.

nkseylon is rich in tin mines, which appear to have been worked enturies back. The mining, in many places, is worked in the itive manner the Chinese adopt, the result being that during dry season (December to March) operations are stopped for want ater.

HE WEST COAST of Junkseylon trends nearly north and h, and has several large bays, with deep water, but none affording protection during the south-west monsoon. The northern half of coast is low wooded land, with the exception of a small portion miles from the north point of the island. The southern half is ge of mountains 1,000 to 1,750 feet high, thickly wooded, sloping ually to the northward and southward, and visible at a distance

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ks charts: Bassein river to Pulo Penang, No. 830; Sayer islands and adjacent

of 30 miles. This side of the island is steep-to, with depths of 10 to 12 fathoms close to the shore. Off the west coast aretwo small islands, named Goh Gavai, one of which is 50 feet high, the other low; they lie close together one mile south-westward from Lem Son, and have deep water around them.

Bandon river lies just south of Lem Son; on it is the town of Bandon, which contains about 100 houses.

PAK PHRA or PAPRA strait, about half a mile in width, separates Salang (Junkseylon) from the Malay peninsula, is about 14 miles in length and much used by junks. The natives are very superstitious about this strait, its name signifying Lord's mouth. The land on both sides is mostly low and wooded, but the capes or lems are high, and within the north shore are hills of moderate elevation. A conical hill about 200 feet in height lies just within Pak Phra point. Along both shores of the strait are several villages where provisions and water may be obtained.

Bar.*—Directions.—The depth on the bar is subject to much variation, ranging from one to 3 fathoms at low water; neither it nor the strait should be attempted without the assistance of a pilot. Off the north point of the entrance, a reef of rocks, only visible at low water, extends a short distance; shallow and shifting sandbanks front both points.

In the south-west monsoon the sea breaks entirely across the entrance, but in the north-east monsoon the bar is generally smooth.

Inside the bar there is good anchorage in 5 or 6 fathoms; and from thence to Lem Khun there is a good channel for small craft with from 4 to 6 fathoms at low water.

The narrowest part of Papra strait is between two points, Lem Hin on the continent and Lem Khun on Junkseylon, 4½ miles within the west entrance, to the eastward of which there is a sandbank dry at low water; to the southward of this bank the depths are 9 feet at low water, whilst 4 and 5 fathoms are to be found on the north, west, and east sides of the bank. Another large sandbank extends from the west side of Lem Asam, between which bank and the aforesaid bank lies the channel.

See charts, Nos. 830 and 842.

* The bar channel in 1893 was tortuous and difficult even for boats. A small craft, with us, drawing 6 feet, had great difficulty in getting through. Remark book of navigating officer, H.M.S. *Pallas*.

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ı Galah is a small white rocky island situated 1½ miles to the ·east of Lem Khun. Goh Janak is a small island lying a ›r of a mile to the south-west of Goh Galah. To the south- ›f Goh Janak there are extensive sandbanks dry at low water, › the southward is Tamaprau river, on the banks of which at les from the mouth the town of the same name stands; miles above is a larger town, Muang Mai, but boats cannot go ıd Tamaprau.

the eastward of Goh Janak and Goh Galah there is good ·rage in from 4 to 5 fathoms.

·ceeding eastward, pass on the north-east side of Goh Galah at les distant, and then steer to pass Lem Sai (on Junkseylon) ›r 1½ cables distant; in this part there are depths of 4 and ıoms. Thence steer to pass about 2 cables northward of Goh ım Jai, a round island, like all the rest in this locality, covered trees; between these two places the channel, which is formed en the fringing sand-banks, is little more than one cable has 12 feet at low water springs, and is composed of soft mud. Passage island steer to pass about 3 or 4 cables southward of Rangam Noi, the water gradually deepening as the latter is ached; pass Lam Lem or cape Three points the north-east of Junkseylon, at 3 or 4 cables distant, in 7 fathoms water. ·e, pass 5 cables southward of Goh Leng and 3 cables north- of Goh Thanan or Pulo Chupo, a small round island one mile ›f Lam Lem. Pass one mile eastward of Goh Thanan and if bound to Tharúa harbour steer between Goh Ret and Goh Joi in about 6 fathoms water.

les.—The tides in Papra strait are very irregular. At the bar mes of high and low water seem to correspond nearly with those ket (p. 118). In the strait, the flood stream sets in from both ıt the same time and meet at the sandbank of Lem Khun. The tream also runs out of both entrances to the strait at the same In the middle of the strait there is hardly any tidal stream, ıe water rises and falls from 6 to 8 feet. At the west entrance › strait the tidal streams sometimes run at the rate of 6 knots; east entrance they generally attain only half that velocity.

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E SOUTH COAST of Junkseylon forms a large bay

is Lem Voalan. At nearly three-quarters of a mile to the southward of this point lies Goh Keo jai or Pagoda island, on the north-west point of which there are two white pagodas. Between this island and Lem Voalan there is a safe passage having 8 to 10 fathoms water. To the southward of Goh Keo jai stands another island, Goh Keo noi, smaller than the former, but of equal height and covered with trees. Besides these two islands there are five others along the south coast of Junkseylon, all high and wooded, with depths of 5 to 10 fathoms round them, except along the north side of Goh Khalom. The inner passage round the south coast is deep; it runs between Lem Voalan and Goh Keo jai, to the southward of Goh Aú and Goh Khalom, and northward of Goh Hee and Goh Bon.

Khelong bay.—During the south-west monsoon the best anchorage is in 5 fathoms, at about 3 cables northward of Goh Aú. In the north part of Khelong bay are two small rivers, Reusong and Mudong, both leading to large villages where water and provisions may be had in abundance at reasonable rates.

In the passages the flood streams set to the eastward, and the ebb to the westward, at the rate of from one to 3 miles an hour.

A patch of 5 fathoms, with a slight overfall at times, lies with the east point of Goh Aú bearing N. by E. $\frac{3}{4}$ E., and the east point of Goh Khalom N.E. by E. $\frac{1}{4}$ E.; less water may exist here.

THE EAST COAST of Junkseylon trends north and south, is fronted with numerous islands, and has two harbours, namely, Puket or Tongka, and Tharúa. Between the east coast and pulo Panjang there is a broad channel, in which the flood stream sets to the northward and the ebb stream to the southward, at the rate of 2 to 3 knots an hour.

PUKET (or Tongka) HARBOUR lies northward of Khelong bay.

Pulo Sirih, an island only separated from the shore by a narrow creek, which at low water is impassable even for boats, forms the north-east extreme of Puket harbour; its south-east point is named Lem Atpha.

LIGHT.—A provisional *white* light, visible 6 miles, is exhibited from an octagonal building painted white, 32 feet in height above the

See plan of Puket or Tongka harbour, No. 843.

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nd, on Goh Tapaunoi. There is a keeper's dwelling and signal aff near it. It is intended to establish a *revolving white* light, le about 15 miles in clear weather.

nchorage.—The harbour is divided into two anchorages by a y flat, over which there is only from 6 to 9 feet at low-water g tides, therefore only small vessels go into the inner harbour, nich there is anchorage in about 2½ fathoms; there is said to be water than is shown on the chart.

ssels of moderate draught should anchor in from 4 to 5 fathoms, half a mile northward of the east extreme of Goh Tapau jai. best entrance is between Goh Tapau jai and Goh Tapau noi.

e bottom, at both inner and outer anchorages, is mud. The our is open to east and south-east winds, during the prevalence nich there is a little swell.

oal.—A shoal of 2½ fathoms lies nearly in the fairway of approach e outer anchorage, with the east extreme of Goh Tapau jai ng S.S.E. distant 3½ cables.

des.—It is high water, full and change, in Puket harbour at 10m., springs rise 9 feet, neaps 7 feet; during the south-west oon the day tides are higher than the night tides. In the north- nonsoon the night tides and the day tides are equal. Very little stream is felt in the harbour.

rections.—Lem Phan Va, the south-east point of Junkseylon, ep-to on its eastern side, but a reef, with rocks awash at water, extends nearly one mile south-west from the point. ls proceeding to Puket, when off this point, should steer north- ard until Tongka hill is seen bearing N.N.W. between Tapau nd Tapau jai islands, when it should be steered for, passing een these islands in a depth of 4 fathoms; thence steer N. by W., ard of the 2½ fathoms shoal before mentioned, if intending to or in the outer harbour.

bound to the inner harbour bring the east extreme of Goh u jai to bear S. by E., astern, and proceed on this bearing until Atpha bears E. by N. ½ N., when anchor as convenient.

ming from the south-eastward, the passage southward of Goh nd Goh Dakmai is recommended. (*See* directions p. 133.) Light

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of Goh Tapau noi, thence as before directed. From the south side of Goh Tapau jai a rocky reef, with a small islet and sandbanks, extends southward to a distance of one mile.

Towns.—Tongka is the principal place in Junkseylon, the residence of the Raja, and the only port frequented by coasting steam vessels. The only export is tin, of which 2,540 tons were shipped to Penang in 1894. The town lies about one mile up a small creek. At high water boats can ascend to the town, but at low water the creek is nearly dry. There is a road from the harbour master's office and pier to the town. The buildings in Tongka are mostly wooden houses with thatched roofs, but there are a few brick buildings. The principal are, the Government house, the residence of the Siamese Royal Commissioner, the stamp office for tin, the barracks and Commandant's house, and several tin-smelting houses. The Commandant has a force of 250 Sikh police to maintain order amongst the Chinese miners who are exceedingly troublesome.

Six miles west of Tongka is the town of Kathu, containing about 8,000 inhabitants, principally Chinese miners. There is an indifferent road between Tongka and Kathu.

Signal Stations.—There is a signal station at the lighthouse, another at the Harbour Master's office, and a third on the hill above Tongka.

Mails.—There is a weekly mail service between Puket and Penang, and a fortnightly mail to Rangoon and intermediate ports.

Supplies.—Fresh beef is difficult to procure, but poultry and vegetables are plentiful, and can be obtained at reasonable prices. Water (not very good) is brought alongside when required. Coal cannot be procured, but firewood can be purchased. Good fresh water can be taken from two wells, one on Goh Tapaujai (pulo Kapal Besar), the other on the north side of Nambo point, the point to the north-west of that island.

The north-east and south-west monsoons prevail here. The former is the dry and sickly season.

Winds and Weather.—(*See* chapter I., pp. 13 and 21.) For further details, *see* Bay of Bengal pilot.

THARÚA HARBOUR* is in the next large bay to the north of Puket. The town of Tharúa, which is situated 1½ miles up a small

* *See* charts, No. 830 and No. 842.

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of the same name, was formerly the residence of the Raja of , who in 1859 removed to Tongka; previous to 1796 (when ia was demolished by the Burmese) it was a town of consider- importance. At that time there was a large Portuguese ment here, and the harbour was frequented by numbers of pean vessels; there is, however, no trade at Tharúa. The ruins ine market street, composed of large brick buildings, and the us houses belonging to the Europeans who once resided here ll to be seen; an evidence of its former importance.

re are two entrances to the harbour, the better one being to the. ward of Alang Noi; the other to the southward of Alang Jai assing to the northward of Goh Mali and Goh Cap.

rections.—Entering the bay, steer to pass about half a mile to rthward of Alang Noi, in 8 fathoms; after passing which the will shoal gradually towards the anchorage, where there is a of 3 fathoms, mud bottom, with Alang Noi bearing E. by N., he middle of Goh Maprau about South. There appears to be a about half a mile to westward of Alang Jai; and vessels should tempt to pass between Maprau and that island, as the channel l. Farther northward are three other islands, Goh Peh, Goh Noi, and Goh Naka Jai; patches of rocks extend for 1½ miles -westward of Naka Noi. Between these last three islands and eylon there is a good channel with from 4 to 5 fathoms of .

ang Bangkrong, westward of Goh Naka noi, is a river leading old residence of the Rajah of Salang.

LANDS.—Goh Jao Jai (pulo Panjang) is a large island, es eastward of Junkseylon, belonging to the Raja of Panga.*

e west coast of this island, which trends in a north direction, moderate height, and has in the middle a large bay named Au , in which there are depths of 2 and 3 fathoms. In this bay are rge villages, and in the entrance lies a small island with a group cks northward of it, some of which are above water. The north f the bay is clear of rocks. Close to the shore along this coast are depths of from 4 to 6 fathoms. Lem Ngia or Nia, the north- point of Pulo Panjang, is a high bluff, steep-to.

e south coast forms Au Lubaling, a shallow bay; in the

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village of the same name. Goh Musang forms at low-water the south-west point of the bay; it is connected with the main island by sandbanks and rocks, over which there is a depth of about 3 feet at high tide. About 2 or 3 cables south-east from this island are some rocks about 30 feet high, and there is broken ground about one mile off, with depth of from 3 to 6 fathoms. Outside are depths of 10 to 16 fathoms.

The east coast of Goh Jao Jai is high and bold with deep water close to the shore; it takes a nearly north and south direction as far as Goh Rang Nok (Bird's-nest island), and thence north-north-westward and is low and sandy as far as Lem Sam, the north-east point of Goh Jao Jai. About 3 miles north-eastward from Lem Hualan, is a group of rocks, of which at high water only one small point is visible, about 2 feet above water; between the rocks and the main island are depths of 8 and 9 fathoms, and one mile outside the rocks the depth is 14 fathoms.

The north coast of Goh Jao Jai takes a westerly direction, and is mostly low and sandy; the water along this coast is shallow, the north-west point excepted, where there is a depth of 5 to 6 fathoms close to the shore. The mountains of Goh Jao Jai form one long range, from 500 to 1,000 feet in height, extending from the north-west to the south-east point of the island.

Lem Hualan, the south-east point of Goh Jao Jai, is a high, bold point, with deep water close to the shore.

Goh Gai or **East Bungo.**—At 5½ miles south-south-eastward from Lem Hualan is a small pointed rock, about 5 feet high, with deep water around it; and 3½ miles southward from this rock is Goh Gai, a round island 100 feet high covered with trees, with deep water around it.

Goh Dakmai or **West Bungo**, a high, square, almost perpendicular island, lies east-north-eastward from the north point of Goh Mai Tan, and there is deep water around it. There is a safe channel for vessels coming from the south-east and bound to Puket, to the southward of Goh Gai, and then in between Goh Mai Tan and Goh Dakmai.

Goh Mai Tan.—About 3½ miles south-westward of Goh Dakmai and 4 miles east-south-eastward from the south-east point of Junk-

See charts, No. 830 and No. 842

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on, is Goh Mai Tan or pulo Bambu, a narrow island, 1½ miles in th, of moderate height and covered with trees. At one cable off outh point lies a group of rocks partly visible, with deep water e to them. The north-east coast of this island forms a sandy bay, ch affords some shelter in the south-west monsoon, in depths of d 7 fathoms. The north point is low and sandy having a rock, ch is always visible, off the extreme. Within half a mile of this nd are depths of from 10 to 15 fathoms all around it.

oh Khai Nok is a small, low, sandy island, lying in the nel between pulo Panjang and Junkseylon, about 5 miles E.N.E. n Lem Atpha, with a bluff on the south side, covered with trees; surrounded by rocks to a distance of about three-quarters of a , of which two patches are visible, the one north-westward, the r south-eastward of the island.

oh Khai Noi is smaller and lower than Khai Nok, from which separated by a channel 2¼ miles in breadth, with depths of 10 and athoms. This island is surrounded by rocks, which do not, ever, extend far out.

oh Sob (*Sisters*) are two small, high perpendicular rocks, about iles northward from Goh Lipe (a conical rock more than 100 feet), and about one mile off the coast of Goh Jao Jai (pulo Panjang); is deep water all around them.

OH JAO NOI is about 500 feet high, and thickly wooded, lying northward of Goh Jao Jai, from which it is separated by a channel a quarter to 1¼ miles in breadth. In the western part of the nel are depths of 3 to 5 fathoms along the Goh Jao Jai shore; ds the middle of the channel the water shoals to 1½ fathoms, n the eastern part it deepens again to 4 and 5 fathoms. About mile north-west from Lem Sam, is a rock about 10 feet high, south of which are depths of 5 and 6 fathoms. Lem Sam is a low sandy point, with a bank extending from it in a northly direction; to the northward of the bank is a depth of oms, and to the eastward of it 7 and 8 fathoms for about half ; it then shoals to 2 and 3 fathoms, filling up the space between ang Nok and Goh Deng (two small islands about 1¼ miles to

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The east coast extends north and south and nearly in line with the east coast of Goh Jao Jai. About 3 cables off Lem Sai, the south-east point, are two small islands, Goh Deng, surrounded by sandbanks and connected with the main island by a reef. To the north of these islands the coast is perfectly clear, with 5 and 6 fathoms close to the shore, and from 9 to 10 fathoms about one mile off. About 2 miles off the coast is an extensive group of islands, all very high and bold, and almost without exception steep-to. The southernmost of the group is named Goh Gaman. Between these islands and Goh Jao Jai is a channel with depths of 10 and 12 fathoms. The flood-stream in this channel sets to the northward, the ebb to the southward, at the rate of about 2 or 3 miles an hour.

The south coast trends in a westerly direction; it is mostly low and wooded, and there are large sand and mud banks extending along the whole length of it.

Goh Boi Jai.—The west point of Jao Noi is connected by a reef with a small island, Goh Jung, to the north-west of which is a large high island, Goh Boi Jai, with deep water on its west side; between this island and Goh Jung there is a depth of 1½ fathoms and the bottom is rocky.

Goh Boi Nai, two small, round islands, about half a mile north of Goh Boi Jai, are surrounded by shallow water, and between them there is a depth of 1½ fathoms.

Goh Bantan, a larger island, about one mile north of Goh Boi Jai, is about 200 feet high, and has deep water on its west and north sides.

Goh Plong, about one mile northward from the west point of Goh Jao Noi, is surrounded by rocks and sandbanks.

Lem Dakmai, the north point of Goh Jao Noi, has several islands off it; immediately to the northward are two high, perpendicular islands, Goh Doda, which can be passed on either side, but the channel north of them is generally used, as it is the broader; in it the depth is 7 fathoms. About one mile east from Goh Doda are two high, perpendicular rocks named Goh Thalu; between Lem Dakmai and Doda is a depth of 7 fathoms.

Goh Broi and Goh Batang are two high, bold islands north-west of Lem Dakmai; Goh Broi has deep water on its north and

See charts, Nos. 830 and 842.

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Gahlam and Goh Klui; this channel trends about N.W. by N., is the usual passage up to Panga. Goh Klui and the island near e similar to Thalu, being high with steep sides.

OAST.—In the bay northward of Goh Jao Noi, besides many l there are three tolerably large rivers: the Takuatung, the a, and the Paklan rivers.

ASOM or TAKUATUNG RIVER lies at the head of the within and north-eastward of Junkseylon. At 4 miles up the is the town of Kasom, where the Raja of Takuatung resides, whence a large quantity of tin is exported. At the mouth of iver is the high, bold island Goh Panji, abreast which there is a h of 2 to 3 fathoms in the channel between the sandbanks, nce for a short distance up are depths of 3 to 4 fathoms; the h to the town is not stated, but a pilot is necessary.

rections.—The Kasom is approached from the southward to in 2 miles of its mouth, by passing between several islands, Boi Jai and Goh Bantan on the east side, and an extensive group ery high, bold islands, 500 to 1,000 feet in height, lying along oast of the mainland on the other side. The largest of these ds, Goh Chanak, about 2¼ miles westward of Goh Bantan, is t 2 miles in length and 500 feet high. The space between this p of islands and the mainland is encumbered with rocks and banks, some of which are visible at low water.

essels bound to Kasom should, after passing pulo Sirih, east coast unkseylon, at about one mile off, keep in about mid-channel een Goh Chanak and Goh Bantan, where there is a depth of thoms; from here a north course leads up to the entrance to the , the water shoaling gradually. Vessels may anchor in from 4 fathoms, at low water, at 2 miles from the mouth. Both out- and in the mouth of the river are large sand banks, between h there is a channel with from 2 to 3 fathoms water. The

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channel takes a north-north-east direction as far as, and close to, two small islands (Goh Nam Sao), the only islands on the starboard side going in. Thence the channel trends north-north-westward, and is narrow.

GOH MAK (Betelnut island) is a low, wooded island, about 1½ miles in length and three-quarters of a mile in breadth, in the approach to Panga river, and in latitude 8° 16′ N. It is surrounded on the north, west, and south sides by extensive sandbanks, and also to some little distance on its east side.

Anchorage.—There is anchorage off the east side in about 7 fathoms, with the rocks off Goh Klui bearing S.S.E. ¾ E., the north side of a high and perpendicular wooded rock E. ¾ N.; and the apparent north extreme of Goh Mak W. ¼ S. The water shoals rapidly from a depth of 6 fathoms (H.M.S. *Pallas*, 1893). The Raja of Panga has a house here, and good water is plentiful. The best water is to be obtained on the north-east side of the island, and at high water boats can go close up to the well. Poultry, vegetables, and fruit can also be procured.

A flat, composed of sandbanks and rocks, parts of which are visible only at low water, extends about 4 miles southward and westward of Goh Mak; southward of this flat there is a channel, in which the depth is 1½ fathoms at low-water springs, but it is not often used.

PANGA RIVER.—The town of Panga is situated about 12 miles up the Panga river, or about 15 miles above Goh Mak anchorage.

Steamers of 6 feet draught can ascend the river for about 4 miles, to abreast a remarkable limestone cliff about 500 feet in height

Here the river is barred by a sandbank, and there is only about 2 feet at low water in places, up to Panga, some 8 miles above.

A wooded islet divides the mouth of the river into two channels; the eastern is the navigable one. There is a passage to the Kasom, about 1½ miles above the entrance, and a stream equal to the Panga enters it from the eastward at about half a mile above the passage to the Kasom. The shallow water in the Panga is usually marked by a tall reedy grass growing on it, and is therefore easily avoided.

The valley and town of Panga are surrounded by precipitous cliffs of about 1,000 feet in height; the valley is exceedingly fertile, and

See charts, Nos. 830 and 842.

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e is a considerable rainfall (May to December). The population robably about 2,000, mostly Siamese, with a few Malays and namen. Supplies are abundant.

AKLAN RIVER lies 4 miles eastward of Panga river, and in north-east corner of the bay; between this river and Goh Mak e is a good channel with depths of 3 to 5 fathoms water.

f the river there is a bar with a depth of 2 fathoms at low water he fairway, but inside there are depths of 5 to 3 fathoms for a iderable distance. Ban Paklan, the Raja of Paklan's residence, uated 6 miles up the river.

irections.—Vessels approach both the Paklan and Panga rivers vard of pulo Panjang, and may anchor abreast Goh Mak, about les below their entrances.

nence for the Paklan, from Goh Mak steer to pass eastward of a l rock 20 feet high, which lies 1¼ miles north-east from Goh Mak, passing which borrow on the mainland side to avoid the sand- s extending southward from the westernmost of two high, bold ds, Goh Song Phi Nong, which lie about 2 miles south-west the mouth of the river. Pass between the islands and then straight for the river.

em Sak, about 5 miles northward of Goh Jao Noi, is high, bold , but the point itself is low, sandy, and covered with trees. s and sandbanks, partly visible at low water, extend about one from the point; between this point and Lem Deng is a large shallow bay.

em Deng is a high, bold point to the south-east of Lem Sak; vard of it is a bay with several high rocky islands. From Deng the coast of the mainland takes a south-south-east tion for about 11 or 12 miles to Lem Hua Nak. In the middle is coast is Lem Din Deng, a point from which rocks extend to distance. North-west of Lem Din Deng are large groups of , bold islands, between which and the mainland is shallow water om one to 2 fathoms. On these islands the natives collect edible s nests. From Lem Din Deng towards Lem Hua Nak the coast ar, and the water deepens gradually from 3 fathoms at one mile

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Lem Hua Nak.—Islets.—Lem Hua Nak is a moderately low point covered with trees, with shallow water extending about half a cable off it. Two islets lie S.W. ½ S. one mile, and S.W. ½ S. 3 miles from Lem Hua Nak. A rock just awash at high water lies about a cable northward of the inner islet. In the fairway between this rock and the mainland the depths are about 12 fathoms and apparently regular.

BAY OF SEVEN ISLANDS.—Eastward of Lem Hua Nak is a bay with seven islands. The bay is about 4 miles wide by 2½ miles deep, backed by moderately high hills. Its eastern side is formed by a succession of remarkable perpendicular limestone cliffs some 300 feet in height. One of these, situated less than half a mile within the east point of the bay, resembles a banana, and is unmistakeable, and may be seen from a considerable distance, together with the high extreme of the point southward of it.

REDPOLE BAY.—Eastward of Banana rock point is a bay with a low wooded shore intersected by several streams, one of which is the Ghirbi. H.M.S. *Redpole* anchored in a bight about half a mile across, on the western side of this bay, a few cables northward of Banana rock point. Here, in a position about midway between the entrance points, and about half a mile off shore, is a depth of 3½ fathoms, with shelter from all but south-east and easterly winds. The head of the bay dries to about one cable off shore, with depths of about 2 fathoms a short distance beyond. No natives were seen, but partridges, quail, and snipe were plentiful.

GHIRBI (or Gerbi) BAY.*—To the southward of Lem Hua Nak is a group of small islands, the largest of which are Goh Damhok and Goh Damgoa, both high and bold. To the south-eastward of the point the coast forms Ghirbi bay, the entrance to which is between Lem Hua Nak and Goh Damhok and Damgoa; the water shoals gradually from the entrance, to 3 fathoms at about 2 miles W.S.W. from the mouth of Ghirbi river.

Ghirbi river is the middle one of three in the north part of Ghirbi bay; it leads up to a town of the same name, the residence of a Raja.

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* *See* chart, No. 842. Information is much wanted on the coast lying between Ghirbi bay and Perlis river; the chart and directions must be used with considerable caution, and those without local knowledge should give this portion a wide berth.

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upplies.—Coal.—There is a large export of poultry and vege-
es from Ghirbi, and coal in considerable quantities is found here;
it is quite unsuitable for steaming purposes.

akasi river.—South-east of Ghirbi river is Pakasi, another
r, in the mouth of which are depths of 4 or 5 fathoms, but
e are large sand banks in the approach, with depths of 2 fathoms
veen them in about the direction of West from the river; but
e is known of it.

oh Luang.—Lem Luang is the north-west point of a large island
he same name, situated off the coast south-east of Ghirbi bay; it
parated from the mainland by a broad but shallow strait, at the
h entrance to which is an islet. Goh Luang is mostly low, but the
e is high and pointed. To the westward of Lem Luang there are
ths of 10 to 20 fathoms, but to the north and south there are
lbanks.

ocks.—Between Goh Luang, and Goh Pipidon 10 miles seaward
, there are said to be some rocks nearly awash at low-water spring
s.

oh Ladujang is a large square island to the east and south-east
oh Luang, being separated from the latter and the mainland by a
nnel from one to 2 miles in breadth, with from one to 3 fathoms
er. Goh Ladujang is mostly low land, covered with jungle, and
h but few inhabitants.

OGEL ISLANDS.—The Vogels are a group of islands lying
he southward of Ghirbi bay. The group consists of one large and
small islands. To the northward of the large island are two
h small islands named Goh Jung, and also Goh Mapai, which is low;
he southward is a high and bold island, Goh Pipithall; besides
se there are two small islands.

oh Pipidon, the largest of the Vogels, is a high, wooded island,
iles in length, by 2 miles in breadth, and apparently steep-to on
west side; the south and highest part forms a deep bay with
7 fathoms close in-shore. Extending about half a mile from the
th-east point there is a reef surrounded by a large sandbank;
reef is always visible. Between Goh Pipidon and Goh Pipithall

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Goh Pipidon lies Goh Ma, a small round island ; and between it and the islets southward of Goh Pipithall there are two large groups of rocks covered at high water.

A patch awash at low water is charted nearly 3 miles S.W. by W. of Goh Ma, and there is a doubtful 4 fathoms charted midway between Goh Ma and pulo Raja.

PILGRIMS are a group of five islands lying 13 miles southward from Goh Ma ; they are all small, whitish-looking islands, bold and apparently steep-to, with reported depths of 20 to 24 fathoms within one mile ; these depths are not borne out by the chart. They are not visible at night as clearly as the other islands along this coast on account of their white colour. The largest of the pilgrims is named Goh Haji.

PULO RAJA, situated about 10 miles southward of Junkseylon island, attains a height of 1,064 feet in the south-western part, while the north-east side is low.*

Gulnare cove, at the north-west point is about half a mile in length by a quarter of a mile in width, having a depth of 9 fathoms sand, in the centre. There is another small inlet on the north side of pulo Raja, where a stream empties itself during the rainy season.

Overfalls.—There are heavy overfalls in the passage, nearly 5 miles wide, between pulo Raja and the Brothers islands.

BROTHERS ISLANDS, situated about 15 miles southward of Junkseylon, are densely wooded, steep-to, and nearly connected by a reef. The northern island, 517 feet high, has a detached rock lying 3½ cables off the north extreme. The southern island, 239 feet high, is of nearly uniform height ; a reef extends about one cable from its south point.

Current.—Southward of Junkseylon, during the north-east monsoon, the current sets north-west ; during the south-west monsoon it sets south-eastward, but if the wind has been strong from West or W.N.W., the current, southward of the Brothers islands, will run to the eastward.

* *See* chart, No. 842, with view of pulo Raja ; also foot note on p. 127. Information relating to the outlying islands of Malacca strait from pulo Raja to pulo Penang is from Commander Hon. F. C. P. Vereker, H.M. Surveying vessel *Magpie*, 1883-4.

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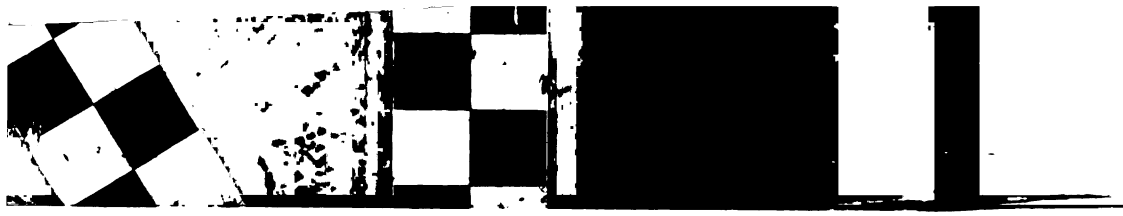

LAT DUJANG.—Goh Tingsing, to the southward of Goh
ijang, is separated from it by a channel nearly one mile in
dth, named Klat Dujang, with reported depths of 3 to 4 fathoms.
Tingsing is higher than Goh Ladujang and also densely wooded.

t the west entrance of Klat Dujang lies an extensive sandbank,
ly dry, on the south side of which there is a passage leading sea-
l, with 1½ to 2 fathoms at low water.

i the eastern entrance to this channel lies a group of islands, the
est of which is Goh Krapu, high and steep-to ; it does not appear
he chart.

long Dujang entrance is about 15 miles southward of Klat
ang, within pulo Lantar; no information has been received
ecting it.

ULO LANTAR is a large high island (reported to be two
ds) to the southward of Goh Tingsing, and only separated from
a narrow and shallow channel. The west sides of these islands
nd in a line nearly north and south. From seaward they appear
ne island, the narrow channel just mentioned not being visible,
the sandbanks in the entrance of Klat Dujang filling up the
le entrance of that channel.

long the east sides of pulo Lantar and Goh Tingsing are several
ll, high, and wooded islands. South-eastward of Goh Rekam,
middle island of the group, about one mile distant, lies a rock
ch is always visible, resembling two square sails standing out of
water. Between these islands and the sandbanks, extending from
mainland, is a channel with depths shoaling gradually from
homs at the south point of pulo Lantar, to 3 fathoms eastward
Klat Dujang.

outh-eastward of pulo Lantar lies a group of islands ; one of the
est is Goh Muk. The westernmost of this group, about 4 miles
n Koh Muk, is apparently about 3 miles in length ; reefs extend
n its north and south points to a short distance.

oh Muk is a square high island, with a low sandy shore on its
ern side. From the mainland opposite large sandbanks extend,
between these and Koh Muk, close to the island, is a channel,
ng, in the shallowest part, 1½ fathoms at low-water spring tides.
n Goh Muk bearing West, distant one mile, it is stated that small
may anchor in 3 fathoms, sand.

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Koh Kadan, a long, narrow, and high island south-westward of Koh Muk, is said to have deep water on its west side; its east side is foul, and from its south point reefs extend for several miles; some are awash at low water, but all are covered at half tide.

KOH LIBONG or PULO TELIBONG is a large triangular island about 20 miles south-eastward of pulo Lantar. The west and south sides of Libong are high, and the north and east sides are low; its summit is about 1,450 feet above the sea. The island is separated from the mainland by a channel about 1¼ or 2 miles in breadth, in the western entrance of which, on the Libong side, there are depths of about 2 fathoms; but in the eastern portion the channel is narrow, with about 3 feet less water, and runs between large sandbanks which dry in places; it runs close along the Libong side and southward of Koh Nok.

Koh Kang, a small rocky island off the south-west point of Koh Libong, is connected with that island by a reef, which dries at low water.

Caution.—Off-lying shoals.—Between Libong and Kadan are the following dangers:—A group of rocks, awash at low water, situated with the south end of Libong bearing S.E. by E. ½ E. about 5 miles.

Shoal rocky ground (P.I) with the south end of Libong E. ½ N., about 4 miles; and a third shoal with the south end of Libong E.N.E. about 3 miles. H.M.S. *Pallas*, 1893, reports these rocks to dry about 5 feet and to be situated about 1½ miles N.E. of the charted position.

The positions are approximate, and other dangers may exist hereabouts.

Anchorage.—Good anchorage may be obtained during the north-east monsoon period, in 7 fathoms, with the south extreme of Libong bearing N. by E., distant half a mile. Vessels should not seek shelter eastward of the point in the south-west monsoon period.

TARANG (Trang) RIVER[a].—On the mainland, abreast the east coast of pulo Telibong or Koh Libong, there is a large bay, into which two rivers discharge; this bay is encumbered with rocks and sandbanks, of which the greater part are visible at low water. Tarang river, the northern of these, may be approached either northward or eastward of Koh Libong; the northern channel has about

[a] *See* chart, No. 842, and footnote on page 127.

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athoms at low water as before stated ; the eastern has apparently less than about 2 fathoms as far in as the north end of Libong. in which the depth is also 1½ fathoms.

n the west side of the river-mouth is the small fishing village Sua, where river pilots may be obtained. Tarang river runs up general north and south direction, and apparently extends ards of 20 miles inland ; it is narrow and tortuous with from et to 4 fathoms in places at low water spring tides. The channel arked by beacons or stakes, available with local knowledge.

owns.—The old town of Tarang, where the Governor formerly led, was 13 miles up the river, and as far as that place, the river ascended by His Siamese Majesty's ship *Regent* in September, , drawing 10½ feet. At 3 miles above is the Chinese town of tani, to which it is said vessels of the same draught could gate in the wet season ; however, only very light steamers use river.

new town, named Guntan or Kantan has been built 8 miles w Tarang on the left bank, to afford greater facilities for trade, seat of Government has been removed to this place.

xports.—The exports (1894) included 6,000 to 7,000 live pigs, o 80 tons of tin, and some 3,000,000 attaps, made from the dunny n for roofing purposes.

alean or Plien river empties into the bay, eastward of the ang ; at its entrance, and for some distance up it has depths of 3 fathoms. A steamer drawing 12 feet can get about 1½ miles the river at three-quarters flood, at which distance there is a ing village. A steamer, drawing 6 feet, can proceed up 15 miles igh water. The Raja's residence is about 7 miles up the river. and pepper are exported, and coal is found in considerable ntities, possibly of same poor quality as that near the Ghirbi, 28. Several other minerals are also found here.

OAST.—The following rivers are situated between the Tarang Kedah rivers :—Paknam Lewang ; Klong Lare ; the Lungu ; ul ; and the Perlis or Polit.

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See chart, No. 842, and footnote on page 127. The off-lying islands, the Brothers,

PULO MOHEA, a group consisting of two large and one small islands lying close together, at about 17 miles south-east from the Pilgrims, are two wooded islands, 524 feet and 783 feet in height, with deep water around them. The east side of these islands is steep-to, and on this side of the southern island is a waterfall, the water falling almost from the top of the island into the sea. On the west side the islands slope gradually, and on this side, abreast the north island apparently, is a sandy bay, with good anchorage, the water shoaling gradually to the shore; vessels may find good shelter here in the south-west monsoon.

The south point of pulo Mohea is high, bold, and steep-to.

Sangald (Guilder) rocks, are situated 14 miles westward from the south point of pulo Mohea and form a group, of which only two small points are above high water. The south rock is about 8 feet, the north rock about 4 feet above high water, and there is from 30 to 35 fathoms water round them. These rocks are dangerous, being hardly visible in the south-west monsoon, and there is often a very strong stream running past them.

General Directions.—Steam vessels from the south-eastward and bound for Puket harbour, should pass between Sangald rocks and pulo Mohea, this being a clear channel with 25 to 30 fathoms water. When about one mile off the south point of Mohea, shape course for the north point of Goh Mai Tan, passing about 4 miles westward of the Pilgrims. In this part the flood stream sets north-westward, and the ebb south-eastward; in the offing the reverse is the case.

Vessels proceeding in the reverse direction, may from off the south point of pulo Mohea, shape course to pass eastward of the Butang group. Pulo Tengah, 680 feet high, lies in this channel nearly midway between the Butang group and pulo Terutau. By passing westward of pulo Tengah, and between it and Pin islet, 7 feet high, and reef, all danger from the two rocks reported to exist between pulo Terutau and pulo Tengah, as well as any others that may exist in that unsurveyed portion. will be avoided. Thence course may be shaped for pulo Lada

Small vessels, with local knowledge, bound to Kedah may pass between the islands of Terutau and Langkawi, and the mainland, in depths of about 3 fathoms; the shore of the mainland is skirted by

See chart, No. 812.

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out 2,000 feet, and one peak to 2,402 feet in height. The southern mity, Pyramid point, is a conspicuous hill 839 feet high. A black awash at low water, is reported to lie 4 or 5 miles off the north- side of the island. Another rock is said to exist in this channel; ecommended channel is westward of pulo Tengah.

pire island, situated 2¼ miles eastward of Pyramid point, and to the south coast of Terutau, has a remarkable spire-shaped , 625 feet high.

ail rock, at one mile south of Spire island, is a square rock feet high, resembling a sail. A rock 30 feet high lies 4 cables n-westward of Sail rock.

Wanderer bay.*—Good anchorage may be found in Wanderer on the east side of pulo Terutau, which being nearly land-locked, eltered from all winds. In the centre of the bay is a conspicuous 175 feet high, with white patches on its eastern side; it forms a mark when making for the anchorage, and can be seen between h and South islands between the bearings of S.W. by S. and S. Anchorage is recommended in the centre of the bay, from o 2 cables north-westward of South island; as a bank of sand mud, somewhat steep-to, extends about 3 cables off pulo Terutau rds South island, leaving a channel between of about 1½ cables idth, with a depth of 5 fathoms.

irections.—Steer in with the conspicuous rock bearing W.S.W., anchor in about 3½ to 4 fathoms when the north extreme of h island bears S.E. by E., or from that position steer towards the d, near which there is a depth of 5 fathoms.

upplies.—When visited by H.M.S. *Wanderer*, in March, 1889, e was a small Malay village named Petok Wau, situated within mouth of the creek abreast South island, also a few Chinese rmen curing fish for export. There are a large number of wild

See chart, No. 793 and No. 842.

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pigs on the island, and some were shot in the clearing around the village. Fish may be obtained with the seine; the best place, most clear of rock, is the neighbourhood of Bold point. Here also is a stream of good water.

Tidal streams.—The flood stream runs northward for 6 hours, and the ebb to the southward, at the rate of about one knot at neaps. Neaps rise over 6 feet.

BUTANG GROUP.—This group of islands, lying about 20 miles W.N.W. from Langkawi, are well wooded, and appear as one large island until within a few miles of them. From the north-westward, Dome mountain is seen over the eastern part of pulo Rawi, which is flat-topped, the peak of pulo Butang showing west of it.

These islands are steep-to, having no anchorage except off the south sides. Water is plentiful on all the larger islands.

Observatory islet, on the south-west side of the group, is 94 feet high and steep-to; the observation spot is on the north side in lat. 6° 29′ 52″ N., long. 99° 10′ 45″ E. Between Observatory islet and pulo Butang are seven small islands from 100 to 200 feet high having no safe navigable channel between them.

Pulo Butang shows with a sharp summit (928 feet) when seen from the north-east or opposite direction; anchorage may be obtained off the south-west side in 11 fathoms, sand and shells, one-third of a mile off shore.

Pulo Rawi, the eastern mountain of which is 1,594 feet high, and flat-topped, is separated from pulo Butang by a channel a quarter of a mile wide. A small islet is situated close to the north-west point, to which it is joined by a reef dry at low water.

Water.—A cascade of excellent water will be found on the west coast, half a mile south of the north-west point, and is a convenient watering place.

Pulo Adang, the eastern of the two large islands, has a long sandy beach on the west side, fronted by a coral reef which extends one cable seaward. A small island, 98 feet high, lies 9 cables eastward from the north-west point of pulo Adang.

Dome mountain, 2,315 feet high, on the southern part of pulo Adang, is conspicuous from all directions.

See charts, No. 739 and No. 842.

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ılo Nipis is separated from the south side of pulo Adang by a ow channel three-quarters of a mile wide ; it has two hills, the ern, 385 feet high, being the higher.

rock, 12 feet high, lies one mile E.N.E. from pulo Nipis.

ılo Besi is a narrow island one mile in length and 424 feet ight, 1½ miles off the north-east point of pulo Adang. A rock et in height lies 4½ cables south-eastward from the south point ılo Besi, and another 1½ cables southward from the same point.

n islet and reef.—Pin reef is a narrow ledge of coral, steep-to, able in length, and has a rock 7 feet above high water near its e.

ılo Téngah, or Half-way island, situated midway between Adang and pulo Terutau, are two islands nearly joined by lers at low water. The highest part, 680 feet, is near the north of the south island, and shows as a cone from the south-west-

ULO LANGKAWI, separated from pulo Terutau by a channel y 4 miles wide, is mountainous, formed and flanked by towering s of limestone, and is thickly wooded.*

nong Raya, 2,952 feet, the highest and most conspicuous tain, is situated near the middle of the island ; viewed from estward, it makes as three peaks.

nong Chinchang, or serrated mountains, rise abruptly from the rn coast, the summit being precipitous and rocky. The highest of the ridge is 2,413 feet in height, and another conspicuous -topped mountain, 2,348 feet high, rises immediately over ot Penyú (Dolphin nose).

llages.—Pulo Langkawi and the adjacent islands are subject to aja of Kedah. The valleys and plains are well cultivated with ugar, &c. Hot springs have been found near Tanjong Gamarau, rth-east extreme of the island. The natives are peaceable and ly, and there are numerous villages ; the principal one is Kwah, ed at the head of Bass harbour ; it has a considerable population h Malays and Chinese, principally fishermen ; the next in tance is situated about half a mile from the mouth of a small which empties at the north-east corner of Kwala Malacca, on

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the west coast of the island, and is said to contain 4,000 inhabitants, many of whom are Chinese; It was also, in 1884, the residence of the Chief or Datu.

Trade is carried on with Penang and the adjacent coasts by junks; Siamese gunboats occasionally visit the island.

Supplies.—Fowls, eggs, and other small supplies can be obtained for silver dollars. Wild pigs are numerous, and the Argus pheasant is occasionally seen.

Kwala Malacca.—From Tanjong Tukan Raja, the north-west point of Langkawi, the coast trends south 5 miles to Tanjong Bongkot Penyú, or Dolphin nose; it is rocky, with a few sandy beaches, backed by precipitous mountains covered with jungle. Between Bongkot Penyú and pulo Rebah is Kwala Malacca, protected from winds between S.S.E. through east to North, affording good anchorage for small craft. The north shore of the bay is rocky. At one mile eastward from Bongkot Penyú is a small islet, connected with the shore by a reef. The bight eastward of the islet is known as Burau (old well); about 1½ miles inland, at the foot of a precipice, are several old wells from whence the name arises.

At the head of the bay is a long sandy beach, fronted by a bank of soft mud, rendering landing impracticable at low water except off the mouths of the two streams. The beach is backed by a fringe of jungle, behind which are several villages surrounded by cultivated land.

Pulo Rebah is a flat-topped island 551 feet high, having a conspicuous red landslip on its north-west side. A rock which uncovers at low water lies about half a cable from the north-west point of the island, and a reef extends the same distance south of the south-west point of the island.

A small islet, 235 feet high, lies off the east side of pulo Rebah, having a reef extending 2½ cables from its western point. A rock 57 feet high, lies between this island and pulo Rebah.

From abreast of pulo Rebah, a sandy beach trends to the southward 2½ miles to Tanjong Sawah, in the centre of which is a conspicuous bluff fronted by a low spur of the hills behind. An island with two rocks off its north-west point lies near this coast.

BASS HARBOUR, between the south coast of pulo Langkawi and the north coast of Dayang Búnting, affords anchorage with

New charts, No. 793 and No. 842.

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lete protection. It is 7 miles in length, with an average breadth miles, and a general depth of 3 to 4 fathoms, mud bottom ; its n entrance is known as Salat Kwah.

m Tanjong Sawah the coast trends north-eastward for 6½ miles ng sandy beach, being a succession of rocky points with sandy between them, and backed by hills rising to the height of et. Along this coast are a few villages ; the principal is Kwah, head of the harbour, as before stated.

e south-east coast of Bass harbour is bold ; some of the cliffs are n and irregular, rising abruptly from the water.

thin one mile eastward of Tanjong Sawah are three small islands, rock about one foot above high water.

oals.*—The following shoals were discovered by H.M.S. *Redpole* e western entrance to Bass harbour :—

. A rocky shoal, about 1½ cables in extent, and drying in places at half ebb, lies northward of the fairway of the south-west entrance to Bass harbour, with the east extreme of pulo Singha bearing W.S.W. distant about 1½ miles.

2. A shoal, of small extent, with about 2 feet on it at low-water spring tides, lies with shoal (1) bearing S. by E. ½ E., distant about 4 cables, and the east extreme of pulo Singha S.W. ½ W.

Vessels should pass southward of these shoals.

lo Singha Kintút, one mile south-westward of Sawah , is 397 feet high, with a double hill.

lo Bras Basah has a sharp well-defined summit 828 feet ; 1½ cables eastward of the south point of the island lies a which uncovers at half ebb.

lo Lada, the south-western island of the group, is hilly and ed with thick jungle. The highest peak, 1,006 feet, situated the southern end, is well defined.

e east coast of the island is indented, with fringing reefs ding about one cable off shore.

lo Chupak, a small wooded islet, 100 feet high, lies 4 cables S.E. the south point of pulo Lada, having 11 fathoms in the channel een.

* *See* charts, No. 793 and No. 842.

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Pulo Dayang Búnting or Tubah is mountainous, with many rugged and peculiar limestone peaks, the highest of which is 1,571 feet high; off the western side of pulo Tubah are several steep rocky islets; the coast line of these islands is formed of high perpendicular cliffs, which, in common with most of the islands off this coast, are undermined below high-water mark for some distance; its north extreme is Tanjong Tirei.

Tyson strait, between Pulo Lada and Dayang Búnting, is the south-western entrance to Bass harbour. In the middle of the strait is a mudbank, one mile in extent, under the depth of 3 fathoms; the least water being 13 feet.

Junk rock, 188 feet high, in the north part of Tyson strait at its junction with Bass harbour, is square-shaped and precipitous.

Canister rock, a small square shaped rock, 68 feet high, is the outermost of the group of islands in the south-east part of Tyson strait.

Tides.—It is high water, full and change, at the Butang group at 10h. 34m. Springs rise 9 feet. The tidal streams are irregular and much influenced by winds and local causes.

It is high water, full and change, in Tyson strait at noon. Springs rise 8 feet. The flood tide runs to the southward out of Bass harbour from one half to one knot, and the ebb stream the reverse way.

Current.—In the offing, the current generally sets to the northward during the south-west monsoon, and to the southward during the north-east monsoon.

COAST.—Satul or Setul river lies within Tanjong Gabus, in about lat. 6° 30′ N., and northward of Perlis river. A depth of 12 feet was found on the bar at low water, which is well sheltered by the islands from the south-west monsoon. A vessel drawing 15 feet, if in charge of a pilot, might enter the river at high water and reach the town of Satul, said to be a few miles above the entrance. Above the town the river is shallow.*

Perlis river entrance lies abreast pulo Langkawi, 20 miles to the northward of Kedah river; coasting vessels anchor off there in 3 fathoms, south-westward of a group of four islands named Panjang, Kuning, Kurap, and Brasmana, which lie near the main on a mud

* Information from Commander Giffard, H.M.S. *Wanderer* 1889. *See* chart No. 793.

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and with a haycock-shaped mount bearing N.N.E.; the mudbank.
ting the coast here is very flat. There is said to be a depth of
eet at high water in the channel over the bar off the entrance.

nks drawing 5 to 6 feet trade to Kangar the capital, 4 miles
the mouth of the river. Polit or Perlis is situated apparently
t 10 miles up.

ukit Perlis, 670 feet high, 2 miles back from the coast, and just
hward of the river, should be a good mark for making the
.

EDAH RIVER.—The entrance of this river is in about
° 6′ N.

he channel over the bar has a low water depth of about 3 feet, from
12 feet at high water, and is marked by five beacons on each
numbered consecutively from seaward, and surmounted by
hond shapes, painted red on the port hand and white on the
oard hand, when entering. Within the beacons the channel
ens and is marked on either side by fishing stakes.

he navigation of the river to Saiburu presents no difficulty to
els that can enter. In the third reach from seaward, where the
r widens, the right bank should be kept. It is necessary to moor
and stern there.

ights.—Two leading lights are exhibited from the north point
ntrance, and when in line lead over in the best water.

ffing anchorage.—There is anchorage in about 4 fathoms
miles off Kedah river, with the entrance bearing E. by N. and
ting island S.S.E.

ides.—It is high water, full and change, at noon ; springs rise
et.

own.—Saiburu or Alostár the principal Siamese town in Kedah
vince is situated about 5 miles up the river, and has a population
bout 6,000. The Sultan resides here.

rom the landing place near the Custom house, a good road extends
t 6 miles in a northerly direction, on which are some very fair
ses, a club, and the British Consulate. This road leads to Singora,
iles from Alostar, where the Governor of the southern province
iam resides. At Anak Bukit, 4 miles from the town, is the

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country residence of the Sultan. The district is purely agricultural. The town is connected with the police station on the north side of the entrance by telephone. A railway is projected to the Prye river.

Kedah province lies between Siam and Perak, and is under the protection of Siam. Its length is about 140 miles and its breadth about 50 miles. Kedah is distinguished from the other states of the Malay peninsula by the greater amount of its level ground which affords considerable facilities for the production of wet grain. The highest hill is Gunong Jerái, 4,019 feet in height, a mass of granite. North of this mountain is an immense plain of gentle elevation, bounded on the east by a small chain of hills 16 to 20 miles inland. Near the coast it is covered with a belt of mangroves from a half to a mile in breadth. The most considerable river is the Kedah, before described. The population of the province is about 34,000, the bulk of whom are padi planters and fishermen.

Elephant mountain, 780 feet high, is an isolated mass of limestone, honeycombed with magnificent caves, situated 5 miles northward of Kedah river entrance, and is a good mark for making that river. It has the appearance of an elephant kneeling, with its head to the southward, particularly when bearing about N.E. by N. There is a smaller hill to the northward of the Elephant.

Off-lying islets.—Pulo Sagantang, a high rock, lies about 22 miles westward of Kedah river and 10 miles south-east from the south extreme of pulo Tubah, Langkawi islands. There are depths of 16 fathoms close to its north and east sides, and 19 fathoms 2 miles south-west of it.

Pulo Paya, lying 6 miles eastward from pulo Sagantang, is high, about one mile in length, 3 cables in breadth, and steep-to with the exception of part of the north-east side. At one mile south-west of the island there is a 5-fathoms patch, and at one mile from the north-west side there is another patch with the same depth.

Pulo Lembu, separated from the north-east end of pulo Paya, by a channel half a mile wide, is about a quarter of a mile in extent, high, and foul on its north side to the distance of 2 cables. In the channel, and about a quarter of a mile from the west end of pulo Lembu, is pulo Kacha, a small rock about 3 feet high.

See chart, No. 793.

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ULO PÉRAK, or Silver island, is a peaked, barren, white , 394 feet high, entirely devoid of trees, and the resort of erous sea-birds ; it lies nearly midway between Diamond point Kedah river. The island is steep-to, there being from 40 to athoms water near it.

ulo Pérak is often taken as a point of departure, and when the ther is cloudy during the south-west monsoon it is not un- uently the first land seen after entering Malacca strait from the- hward. Sailing vessels should then give it a wide berth, for at time calms and light airs are likely to prevail in its neighbour- l, during which vessels have been carried by the current towards. nd have been obliged to anchor in deep water to prevent being- en against the steep rock.

he COAST from Kedah river extends in a southerly direction niles to the entrance of Merbau river, and continues low and ded until within 8 or 9 miles of that river, where Gunong Jérai or- ah peak, 4,019 feet high, is situated at a distance of 4 miles back n the coast. North-eastward of pulo Búnting at 7 miles from the- t is situated Bukit Choreh or False Elephant mountain ; the head of animal it somewhat resembles is situated to the westward and hump to the eastward. Southward of Merbau river, as far as the h entrance to Penang the coast continues low.

ocks.—At 5½ miles southward of Kedah river and at 2½ miles shore, there is a rock with a less depth than 6 feet, with thoms close-to. Also a rock awash at low water, lies 2½ miles- hward of pulo Búnting, and 1½ miles from the shore.

mud-flat with depths of less than 3 fathoms skirts the shore veen Kedah and Merbau rivers, to the distance of about 2 miles, l abreast of pulo Bidan and Merbau river, where the edge of the k is 4½ miles off ; thence it gradually approaches the shore until ast the north end of pulo Penang, where it is one mile distant.

únting islands consist of pulo Bunting, pulo Songsong, pulo-

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10 to 12 fathoms will be found 3 miles seaward of them. Pulo Búnting is 610 feet high, 1¼ miles in length, half a mile in width, and separated from the mainland by a channel one mile wide, having from 6 to 9 feet water. It is situated about midway between Kedah and Merbau rivers.

Pulo Songsong, lying 4 miles south-westward from pulo Búnting and 4¼ miles from the mainland, is almost circular, and about a quarter of a mile in diameter. It is skirted by a reef to the distance of one cable. At one mile south-westward from pulo Songsong are Songsong rocks, 25 feet high, and occupying a space of a quarter of a mile. There are depths of 8 to 10 fathoms close to the rocks.

Pulo Telor lies 21 miles southward from pulo Songsong, and is skirted by a reef. Depths of 7 fathoms are found between the two islands, and the water shoals gradually towards the shore.

Pulo Bidan lies one mile south of Pulo Telor, and is two-thirds of a mile in length, by a quarter of a mile in breadth. The island is almost encircled by a reef.

Merbau river.—The entrance of this river, formed between the low coast on the north and Merbau hills on the south, is fronted by the coast mud flat which has depths of 4 to 6 feet water, and extends nearly 3 miles to seaward. Old Kedah is situated on the north side of the entrance. Off the south side of the entrance is situated pulo Sayer.

Muda river, situated about 6 miles southward of the Merbau, had a depth of about 10 feet on the bar at high water. A village stands on either point of the entrance, and a larger one at about 7 miles up the river, on the right bank.

Caution.—Fishing stakes.—In passing between Kedah river and Penang during the night, care must be taken to keep clear of the numerous fishing stakes which are fixed in places some 6 or 7 miles from the land.

PULO PENANG,* or Prince of Wales island, a British settlement lying between the parallels of 5° 28′ N. and 5° 15′ N., is nearly 14 miles in length in a north and south direction, from 6 to 9 miles in breadth, and has an area of about 107 square miles; it is separated from the mainland by a strait from 1½ to 7 miles in breadth, which affords sheltered anchorage for all classes of vessels.

See chart, No. 793.

* Properly Pinang (the Betel-nut palm), and so called by the natives, but the word Penang is fixed by usage. *See* plan of Penang harbour, No. 1,366.

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n the shore of the mainland, Province Wellesley, also forms
of the settlement. Also the Dinding islands, and a small portion
he mainland abreast them. (*See* also p. 2.)

Depths in entrances.—The northern entrance to Penang is at
times preferable for large vessels, there being about 4 fathoms at
water in the channel, with a spring rise of 9 feet. South entrance
nnel has a depth of 3¼ fathoms at low water springs.

Aspect.—The north part of pulo Penang is mountainous, and
ough the centre of the island runs a range of hills, declining in
ght as it approaches the south-west extremity; but two-thirds of
whole surface of Penang is level and of gentle inclination, and,
the hills, is well wooded. West hill, the highest point of the
nd, is 2,735 feet high; at a short distance to the eastward is
vernment hill, on which stands a signal flagstaff 2,551 feet above
sea. The western side of the island is low and wooded.

Climate.—Produce.—The climate of the high lands of Penang
aid to resemble that of Funchal in Madeira; the thermometer in
plains ranges between 73° and 94°, and on the mountains from
ut 65° to 75°. The rainy season is from May to November, but
n falls throughout the year. The annual rainfall on the plains
ely exceeds 65 inches, but on the hills it is generally about
inches. (*See* p. 12.) Excepting in a few places, Penang is con-
ered to be very healthy. It is not subject to epidemics; cholera is
known and dysentery is infrequent. In some of the low-lying
ces ague prevails. Lepers are numerous, and there is a depôt at
o Jerajak for them.

The soil is favourable to the growth of spices; the chief cultivation
n sugar, rice, and cocoa-nuts.

Owing to the vicinity of Penang to the Bay of Bengal, the influence
the monsoons is more distinctly felt there than in any other
he Straits Settlements. *See* winds, &c., p. 21.

GEORGETOWN, the capital, is situated at the north-east
remity of Penang, with a population in 1891 of 85,000 of whom
majority are Chinese, while the Malays chiefly occupy the
ntry districts. For the province, *see* p. 2.

t is built on level ground, clean and well supplied with water by
pipes from two mountain streams. It has a handsome church,

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two Roman Catholic chapels, a court-house, the government offices, gaol, public school, poorhouse, and the civil and military hospitals.

Butterworth is situated on the main, abreast fort Cornwallis.

Fort Cornwallis is built on the north-east point of the island, close to the town. There are cantonments for troops near the town.

Observation spot.—The fort signal staff is in lat. 5° 24′ 30″ N., long. 100° 20′ 44″ E., assuming the new Observation spot (transit instrument) at Singapore to be in long. 103° 51′ 16″ E. (*See* p. 222.)

Trade.—Penang is a free port. The exports comprise tin, sugar, spices, sago, rice, buffalo hides and horns, rattans, gum, coffee and opium. In 1893, the value of the trade amounted to $232,430,724.

5,800 steam and sailing vessels entered and cleared from the port of the aggregate tonnage of 3,189,522 tons.

Supplies.—The island produces fine timber, which is well adapted for spars and ship-building; also various fruits. All kinds of supplies may be procured in large quantities. Water is conveyed to the shipping in tanks.

Coal, to the amount of about 9,000 tons, is usually kept in stock. Vessels are coaled by lighters, and coaling is but little impeded by the weather.

Sick quarters.—There is a good general hospital 3 miles from the town, and a quarantine station and leper hospital on pulo Jeréjak, p. 147.

On the top of Penang hill, at an elevation of 2,500 feet above sea level, is a convalescent bungalow, distant 8 miles from the town.

Docks.—At the entrance to Prye river, on the mainland, p. 150, is a dry dock. A vessel of 1,000 tons has been docked here. There is also a patent slip. (*See* p. 4.)

Repairs.—Moderate repairs to engines and boilers are undertaken at Penang. A shaft of twenty inches can be turned, a 50-inch cylinder bored, and a casting of 4 tons made. Engines of 600 H.P. have been repaired.

* *See* plan of Penang harbour No. 1,366.

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nall repairs to engines and boilers are undertaken at the foundry rye river; a five-inch shaft can be turned; a 24-inch cylinder d, and a 3-ton casting made.

elegraph.*—Mails.—Penang has telegraphic communication ubmarine cable with Sumatra, India, Singapore.

hese cables are landed at a cable house on the north shore of rgetown, about one mile northward of the fort. A telephone e is laid across the North channel, leading from the cable house to harbour mark obelisk on the main; a conical buoy marked ble" lies one mile E. by N. of Klawei obelisk, and anchorage it is prohibited.

ost of the large Companies' steamers touch at Penang; there is constant communication with the other parts of the Strait lements and with Sumatra. (*See* also p. 3.)

ignal station.—There is a signal flagstaff on Government hill, tward of the town, and 2,551 feet above the sea, as before tioned.

ANKS in the approaches.—Pulo Penang stands on a bank depths of less than 3 fathoms extending from one to 2 miles hward and from 3 to 3½ miles westward and southward. A es of shallow banks skirt the eastern side of the island.

reat Kra flat extends along shore from abreast the e river to pulo Talang, a distance of 60 miles, and has a dth of 10 to 12 miles. This flat, dry in places at low water, rly fills the channel between the south part of pulo Penang the main. Abreast pulo Rimau the flat is nearly 5 miles in dth, from thence it tapers to a point abreast Prye river; the h channel to Penang lies on the west side of the point of flat, and a channel of 6 to 8 fathoms leading to the Prye, u, and Batukawan rivers, lies eastward of it. Southward of these rs and of the Kra islands, Kra flat joins the shore banks and e is no channel for vessels in that direction.

Batumau flat.—Between the south end of pulo Jeréjak and umau point, is Batumau flat, dry in patches at low water. A 2 feet high, lies one cable northward of Batumau point; and

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Middle bank, on the east side of pulo Penang, stretches northward from pulo Jerejak for a distance of 4½ miles, and is dry at low water to within half a mile of its north extreme, where it is separated from the bank which fringes the eastern side of Penang by a narrow channel with a depth of 3¼ fathoms. Between Middle bank and pulo Penang the depths are from 3½ to 5 fathoms water. On the eastern edge of Middle bank is Syrang bank, a narrow ridge one mile in length, the southern half of which dries. The eastern side of Middle bank is marked by red buoys and beacons, (*See* p. 150.)

Islands.—Pulo Kendi.—Two miles off the south-west point of Penang is pulo Kendi or Saddle island, high, about half a mile in length and a quarter of a mile in breadth.

Pulo Rimau.—Separated from the south-east point of Penang by a passage 4 cables in width is pulo Rimau, steep-to on its south-east side, and on which there is a lighthouse (*see* below). From pulo Rimau a shoal bank extends in a circular form to Tanjong Gertah Sangul the south-west point of Penang.

Pulo Jerejak, 741 feet high, lying 5 miles southward from Georgetown, is a bold island, 2 miles in length, and from a quarter to three-quarters of a mile in breadth, rising in a pyramidical form; with Middle bank it forms the western side of South channel.

Sick quarters and a leper hospital are established on the island under the care of the colonial surgeon.

LIGHTS.—On the summit of Puchat Muka (the north-west point of Penang) from a gray granite lighthouse 45 feet high, is exhibited at an elevation of 795 feet above the sea, a *flashing white* light, with a period of *twenty seconds*, visible in clear weather from a distance of 30 miles.

On pulo Rimau, off the south-east point of pulo Penang, from an iron lighthouse erected on its south-east extreme, is exhibited a *fixed* light, showing *red* in the channel to the southward, and *white* over the shallow ground.

On fort Cornwallis, from a white flagstaff in the north-east bastion, is exhibited at an elevation of 107 feet above high water, a *revolving white* light, attaining its greatest brilliancy *every thirty seconds*, and visible in clear weather from a distance of 15 miles.

See plan, No. 1,366.

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vo *red* lights, placed horizontally, mark the northern mole head, two *green* lights, placed vertically, mark the southern mole head.

South channel a *green* light is exhibited from No. 4 beacon, and *d* light from No. 5 beacon, each visible about 2 miles.

ides.—It is high water, full and change, at Georgetown at noon; ngs rise 9 feet, neaps 7 feet. At springs the streams run at the rate miles an hour. During the north-east monsoon the tidal streams regular, the flood or southerly stream running from about 2 hours low water to about two hours after high water by the shore; ebb the reverse. At pulo Rimau it is high water about three-ters of an hour later.

t the change of the monsoon in May, the tides at full moon have range than at new moon; the lowest day tides occur in February March.

n November the current formed by the south-west monsoon round Tanjong Puchat Muka and overcomes the ebb stream, etimes for 2 or 3 days.

n the offing between Penang and Parcelar hill the tidal streams ng springs are regular, the flood setting to the south-east, the ebb h-west, at the rate of $2\frac{1}{2}$ or 3 miles an hour; the turn of the am is probably the same as mentioned above. During neaps there o perceptible stream.

ilots.—The employment of pilots is optional. Pilots will meet sels at the entrance to South channel if requested by telegram or al. Pilots for Lárut river may be obtained at Penang.

NORTH CHANNEL is formed between the mud-flats which t the shore of the mainland and of Penang, and has 4 fathoms er in its shallow part, the channel of deep water lying about lway. The shores of the mainland, being low and covered with s, are not so conspicuous as the high land of the island; sequently the latter will generally appear nearer when the vessel n mid-channel between them. From abreast of Tikus islet the er in the fairway deepens gradually from about 7 fathoms, to and 13 fathoms in the harbour of Georgetown.

Buoys.—The North channel is not buoyed. A red buoy, in fathoms, marking the telegraph cables, lies with the fort light

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A mooring buoy, painted black and white, lies in 4½ fathoms, with the fort light bearing S. ½ E., distant about 4 cables.

Directions.—The fishing stakes which are situated from 3 to 4 miles north-westward from pulo Tikus, and nearly 3 miles from the nearest shore, are a guide to the deep-water channel; these extend into 4 fathoms water, but a good berth should be given to them as there are many old stakes broken off 2 or 3 feet under water. Pass one mile to the northward and eastward of these stakes and steer for the outer buildings on the point northward of Prye river, when bearing S.S.E. until abreast fort Cornwallis, thence altering course as requisite for the anchorage.

Tikus, a small islet surrounded by rocks, with an obelisk as a harbour mark, lies on the mud bank fronting the island at half a mile off-shore, and 4 miles north-westward of Fort point.

Vessels entering at night should observe that Tanjong Puchat Muka light kept southward of S.W., leads northward of the fishing stakes, and that fort Cornwallis light kept southward of S.S.E. leads eastward of them.

These lights afford sufficient guide to the anchorage.

In tacking, the lead is a sufficient guide.

Anchorage.—The anchorage off Georgetown is situated in the narrowest part of the strait, which is here 1½ miles in breadth; it is well sheltered and capable of accommodating a large number of vessels. There is deep water close to Fort point, and the water shaols gradually towards the main land from half a mile eastward of the fort; the best berth for a large vessel is about a quarter of a mile south-eastward of the Fort point in 10 or 11 fathoms, and for small vessels closer to the town, subject to the harbour regulations. It is necessary to moor as the tidal streams run strong. Vessels are prohibited from anchoring in the fairways.

Vessels of War.—A space is reserved for vessels of war about half a mile northward of fort Cornwallis, in which there is anchorage in from 6 to 10 fathoms; it is recommended in preference to the crowded anchorage southward of the fort.*

SOUTH CHANNEL.—The South channel to Georgetown is between pulo Jérejak, Syrang sand and Middle bank on the west side, and Great Kra flat on the east side. The deep-water channel

* *See* plan, No. 1,366.

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in width from half a cable to one mile, and has 3¼ fathoms water.

oys.—The South channel is marked by red buoys and beacons western side numbered 1, 3, 5 and 9 from the anchorage, and ite buoys and beacons on the eastern side, numbered 2, 4, 6, 7 Numbers 4, 5 and 7 are beacons, and on Nos. 4 and 5 lights hibited, No. 4 showing a *green* light and No. 5 a *red* light ore stated. No. 7 is a beacon with disc, on the Kra flat, east f the channel, abreast pulo Jérejak. Buoys No. 9 and 10, 1½ miles apart, mark the flat on either side of the south ce, and from 2 to 3 miles south-westward of pulo Rimau, and ch surmounted by a staff and globe.

hing stakes extend a considerable distance into the fairway ally on the Kra flat side, and it is necessary to exercise caution am vessels to prevent their fouling the screws.

rections.—From the southward a vessel should not bring pulo to bear westward of N. by W. until pulo Rimau lighthouse N.E. ½ N.; course may then be altered for pulo Rimau, passtween Nos. 9 and 10 buoys and within about 2 cables of that ; thence the vessel will be guided by the buoys, to the rage off Georgetown.

ling vessels should not enter the South channel without a coming breeze from the south or south-west, which breeze does not blow except in August and September.

night.—It is optional with the pilots whether they will take s in or out at night, or not.

e COAST.—Prye or Prai river.—The rivers Prye, Juru, kawan and Tengah have their exit on the coast abreast Penang.

e river is situated on the main, nearly abreast of Georgetown astward of the northern end of Great Kra flat. A mud flat dries, extends about 3 cables southward of the northern point trance, and about 2 cables off the east point. The channel over ar has about 9 feet at low water, and is marked by red beacons e port hand, and a white beacon on the starboard hand. The point is embanked, and here are situated the workshops, &c., in ection with the dock, pp. 4 and 145. The river abreast the has from 2½ to 3½ fathoms at low water.

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A harbour mark obelisk is situated near the south point of the river.

Batukawan (Junjon) river entrance has a depth of only one foot at low water; within the bar the depths are from one to 4 and 5 fathoms. It joins the Tengah river on the east side of Batukawan island. The plan will give the best idea of these streams.

Kra islands lie off the entrance of Batukawan river, about one mile distant. North Kra island is one mile in length and 337 feet high, and South Kra is three-quarters of a mile in length and 269 feet high, separated from North Kra by a passage having 3 feet water. There is a channel of not less than 4 fathoms leading from Georgetown to Kra islands and the coast abreast, eastward of Kra flat. Southward of the islands, Great Kra flat blocks the passage.

Krian river,* 3 miles southward of Tengah river, is navigable for craft drawing 4½ feet for a distance of 40 miles. It is an important outlet both to the province of Wellesley and to Pérak.

The coast from Krian river takes a southerly direction to Tanjong Piandang, a distance of 8 miles, thence south-eastward for 11 miles to Tanjong Pasir, in Selensing bay, beyond which at a further distance of 6 miles is Lárut river. This coast forms several bights, is low and thickly wooded, and fronted by flats with depths of less than 3 fathoms in places, to the distance of 10 miles.

Fishing stakes.—There are numerous fishing stakes on these flats many miles off shore, between Penang and Lárut river, but generally within a depth of 3 fathoms.

The rivers Kurau and Kotah enter the sea between Tanjong Piandang and Tanjong Pasir; the former is a considerable stream.

SELENSING BAY.—Sungi Sengar Besar.—Selensing bay forms the approach to Sungi Sengar Besar on which is Port Weld. Selensing river lies to the northward of the Sengar Besar, and also leads to Port Weld, but by a very circuitous route.

The bay is blocked by the shore flats, the continuation southward of the Kra flats; it forms a bar two miles wide with a low water depth of about 4 feet, over a bottom of mud, sand and shells, comparatively hard, in the approach to both these rivers.

* *See* chart, No. 793.

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des.—It is high water, full and change, in Selensing bay at 58m., and at port Weld at 2h. 26m.; springs rise 8 feet, neaps t.

2 miles off Tanjong Krang the flood runs S.E. and the ebb ., at the rate of 1½ miles an hour; probably turning as at ang (p. 148).

Directions.—Approaching Port Weld by Sungi Sengar Besar, the bar which has 4 feet at low water, and 12 feet at high r springs, by passing just northward of the two bar beacons; ifficulty will be found in navigating to Sapetang island, situated a mile below Port Weld, the depths to which are not less 12 feet at low water. This island is nearly connected at water to the shore westward of it; the channel therefore orthward of that island, from whence port Weld will be seen n-eastward of it. Thence to port Weld the depth over the bank bars the river is from 2 to 4 feet at low water; it is intended to ge a channel through this bank. The depth in the river off wharf is from 3 to 4 fathoms.

ORT WELD or SAPETANG is distant 5 miles from the ance to Sungi Sengar Besar, at the junction of that river with tang channel leading from Lárut river; a somewhat longer route the sea, described on p. 153, 154. The bar has 4 feet at low r, and 12 feet at high water springs, and there is about the same h in the channel to port Weld.

ort Weld is the port of Thaipeng the capital, distant about les by rail. (*See* p. 154.) There is also a good road to Thaipeng, to Kwala Kangsa, distant 22 miles, the seat of the Resident érak. The wharf at Port Weld has a depth of about 10 feet gside at low water. There is a daily steamer to Penang.

ÁRUT RIVER.—The entrance of this river lies about 4 miles hward of Sungi Sengar Besar. It is nearly 2 miles wide between

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mud flats which dry at low water. A bar nearly 2 miles in length, with a depth of 4 feet at low water springs, fronts the entrance, inside which the water deepens.

Telok Kertang, about 7 miles from the entrance of Lárut river is the port of Lárut. It has a wharf and custom house; and the river abreast the town is 120 yards wide, with a depth of about 12 feet. A road connects it with Thaipeng, Matang and Kwala Kangsa. The shallowest spot in the river is abreast Trusan Siamang, just below the police station, where the depth is only 4 feet.

Kwala Sapetang, 4 miles within Tanjong Krang, leads to port Weld; its entrance has a short bar with 6 feet at low water springs.

Sungi Limau is separated from Lárut river by an extensive mud bank which dries in patches; the water deepens inside the bar to about 2 fathoms, the channel being marked by fishing stakes.

LIGHTS.—A *fixed red* light is exhibited at an elevation of 30 feet, from a mast painted white, erected on Tanjong Krang, north side of Kwala Lárut, visible seaward between the bearings of N. 10° E. and S. 80° E. from a distance of about 4 miles.

A *fixed red* light is exhibited from the beacon marking south side of the fairway to the river, situated with Tanjong Krang bearing N. by W. ½ W., distant 1⅛ miles; also a *fixed red* light is exhibited from the beacon situated also on the south side of the channel, at the junction of the Lárut and Sapetang rivers.

Beacons with discs, mark the edges of the banks on both sides of Lárut river as far up as Trusang Siamang, just below the police station. The discs on these beacons are painted black on one side and white on the other; those on the south side of channel being black to seaward and white in shore, the northern beacons are the reverse. The black side of the discs must be always kept on the starboard hand, and white side of discs on the port hand, both on entering and leaving the river. Two beacons are also placed on the bar fairway, about one mile apart. (*See* lights on beacons, above.)

Directions.—Vessels should approach Lárut river with the light-house bearing East, until the outer beacons are seen, then they should be steered for, passing from one to 2 cables on either side in a depth of 12 feet at high water springs; pass northward of No. 3

See chart, No. 793.

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ight, off the entrance to Kwala Sapetang, shoot across to the south
e, between the beacons, to avoid the bank extending nearly
ss the channel from the north shore; cross the bar with 12 feet
igh water springs off Trusan Siamang, and keep the south shore
l abreast of the police station. Thence the river is narrow and
ious, but deeper; the concave side should be kept as far as the
point before reaching Telok Kertang, when haul over for it as
as the town opens, to avoid a spit off the creek on the north
e.

roceeding to Port Weld haul into Kwala Sapetang when
channel is well open, the entrance to which has 14 feet on the
at high water springs, thence deepening to Port Weld; when
hin the bar keep the concave side of the channel.

ilots for Lárut river should be obtained at Penang.

ommunication.—Trade.—There is a daily steamer between
ang and Lárut, and telegraph communication with other places
Vellesley province and Penang. The principal export is tin; the
orts are rice and other necessaries for the miners, who are princi-
y Chinese.

HAIPENG (Taipeng) situated at the foot of the Gunong
ei range, and 8 miles from port Weld, is the seat of goverment
he State of Pérak, and also its largest and principal town. The
ses are built of brick, laid out in squares, with streets 70 feet
e. The principal buildings are the court-house and police
acks, the latter accommodating over 800 police who are Sikhs.
re is a reading room and an hotel under European management.
er is led from the mountains and through the town by pipes.
State of Pérak, p. 4.)

he assistant Resident is stationed here, and his house stands on a
overlooking the town and mines.

rade.—Communication.—A railway connects Thaipeng with

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cation with all parts. The chief product is tin from the mines in the district, principally worked by the Chinese. Gold is found in some parts, but not in sufficient quantity to pay for working.

The exports consist of tin, attaps, firewood, sugar, rattans, timber, fruit and salt fish; the imports are specie, rice, opium, live stock, oil, piece goods, and provisions. (*See* p. 4.)

Mountains.—Eastward and south-eastward of Thaipeng, and about 15 miles from the coast, mountains rise from the plains, the principal being Gunong Tupei and Gunong Bubu; the former is near Thaipeng. Gunong Hijau, a mountain eastward of Gunong Tupei, is about 4,678 feet high, and is seen over the latter. Gunong Pondok, 1,800 feet high, a sugarloaf shaped limestone mountain, appears in the pass between Tupei and Bubu ranges. It is seen only between the bearing of E. ¼ S. and E. by N. ¾ N., or when off Lárut river. Except in the rainy season (from about June to November) the summits are seldom visible.

The COAST.—Between Lárut river and Dinding islands the three principal streams are the Trong, Jarum Mas, and Bruas, fronted by the mud bank extending from 5 to 9 miles off shore. The Trong and Bruas are navigable by canoes for nearly 60 miles. The Jarum Mas is merely a tidal estuary.

False Dinding is formed by the two highest peaks of a short range of hills near the coast northward of pulo Dinding, and by a vessel approaching from the northward are seen before pulo Dinding, which they much resemble.

Pulo Talang is a small islet lying a quarter of a mile from the coast near False Dinding, on the eastern edge of a bight in the mud-bank. Westward of pulo Talang the shore bank again extends seaward a distance of 4 miles, joining the shore 7 miles to the southward at Tanjong Hantu.

PULO PANGKOR or Great Dinding island, is 5 miles in length in a north and south direction, 2 miles in breadth, and separated from the mainland by Dinding channel, from one to 2 miles wide and which affords secure anchorage for all classes of vessels. The island is mountainous and densely wooded, the highest part, situated about 2 miles from the north point, being 1,318 feet in height. On the north and south extremes are two hills respectively 748 and 992 feet high. Two other mountains rise near the centre of the island, and attain a height of more than 1,000 feet.*

* *See* plan of the Dinding islands and channel, No. 792.

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at Dinding island, and the adjacent coast, commencing at pulo
: and extending 22 miles in a northerly direction, is British
ory. (*See* also p. 2.)

e population of the Dindings settlements in 1891 was 3,615,
om 2,354 were Malays, 238 Klings, and 902 Chinese.

e climate of the islands has been found extremely unhealthy,
w residents having escaped malarial fever. The head-quarters
e administration were in consequence removed in 1889 from
kor to Lumut, on the mainland, about 2½ miles up the Dinding
where it is hoped the climate will prove more salubrious when
ient time has elapsed to counteract the ill effects of new jungle
ng. (*See* p. 157.)

rt Pangkor.—The settlement at Pangkor, on the east side of
land, consists of a police station and a few houses scattered on
each. The ground in the vicinity is swampy and unhealthy,
ove stated.

ngkor, and the village of Raja Bajau to the southward of it, are
ited by native fishermen and their families.

all vessels may be readily and safely grounded for examination
ight repairs between tides. (*See* Lights, p. 158; Anchorage,
0.)

pplies.—Poultry, eggs, and pigs occasionally, may be procured
st of the native villages at reasonable prices. Fish are obtain-
and may be caught with the seine in the bays; turtle may also
tained in the season. Firewood is procurable.

imal and vegetable life abound, but the density of the jungle
rs the animals difficult of approach. Great Dinding is known
ntain hogs, deer, monkeys, venomous snakes, tigers, alligators,
pedes, &c.

eons and other birds abound. The durian, pine apple, mango,
omegranates, are obtainable in small quantities.

mmunication.—Most of the local steamers which run
en Penang and Pérak river call at port Pangkor, as do also some
ose running between Penang and Singapore. There is thus

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The Mainland.—Tanjong Hantu, the north point of the north entrance to Dinding channel, about 3 miles northward of Great Dinding, is a sloping point the summit of which is 757 feet high.

The coast from Tanjong Hantu to Motts point, north entrance point of Dinding river, is skirted by a shallow bank, having a depth of 3 to 12 feet, and extending a distance of 6 to 8 cables ; it gradually diminishes its distance from the shore southward of Mudge bluff as Motts point is approached, and becomes dry in patches at low water springs at one mile from that point.

Lloyd rock, a pinnacle, awash at low water springs, with 6 to 8 fathoms around it, lies 4 cables West of the point.

Dinding river has a deep and clear entrance, excepting Lloyd rock ; and between Mehegan and Motts points it is 8 cables wide. The deep water passage between North and East banks has a depth of about 4¼ fathoms at low water, thence a channel 3 cables wide, and having 5 to 9 fathoms, extends 3 miles up the river, the farthest point reached by the surveying parties. Yellow cliff, 14 feet high, and Red cliff, 26 feet high, both on the south bank of the river, are conspicuous.

Lumut, situated on the south bank of the river at about 2 miles above its entrance, is the head-quarters of the administration. Here are the treasury, court-house, public offices, police barracks, and hospital. (*See* also remarks on p. 156.)

Anchorage.—There is anchorage off the settlement in from 6 to 7 fathoms, and there is not less than 4 fathoms at low water in its approach.

There is almost daily communication with Penang by steamers calling at port Pangkor.

Pulo Katak, a small wooded islet, 77 feet high, stands on the edge of the bank near Tanjong Katak, south entrance to Dinding channel, and is separated from the mainland by a shallow and rocky passage nearly 4 cables wide. (*See* Light, p. 158.)

The coast between False Dinding and Pulo Katak is rocky with undulating hills close to the sea.

See plan, No. 792.

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INDING CHANNEL.—Depths.—The south entrance to ling channel, to Pangkor the settlement on the east side of the d, is deep throughout, but the northern channel, though it has a h of 4 fathoms at low water, is not recommended for vessels e 18 feet draught.

IGHTS.—From a mast, painted white, erected on pulo Katak, side of southern entrance to Dinding channel, is exhibited, at levation of 114 feet above high water, a *fixed* light, showing e from the bearing of S. 56° E. to N. 35° E.; *red* from 5° E. to N. 55° W., again *white* from N. 55° W. to S. 35° W.; and bscured from S. 56° E. to S. 35° W. The white light is visible ear weather from a distance of 10 miles.

the north extreme of East bank, abreast the entrance to ing river, with Table rock bearing S. by W. ¾ W., distant bles, is a screw pile beacon, from which is exhibited a *fixed red* visible from a distance of about 5 miles.

Hospital rock, off the point southward of Pangkor settlement, *d red* light is exhibited, and on the jetty, formerly known as istrict officers, about 150 yards south-west of the rock, there is a *white* light.

ets and Banks.—North bank, having a depth of 3 to 15 feet nd sand, with one patch dry at low water, lies in the north ice of Dinding channel, and with the shallow bank which skirts ainland adjacent nearly fills the north entrance of the channel ithern extreme lies half a mile north-east from Scorpion point Dinding.

dge rock, 3 feet high, lies on the west edge of North bank, W. by W., distant $1\frac{1}{16}$ miles from Tanjong Hantu.

outlying patch of 3 fathoms is situated 7 cables W. by S. from rock.

ys.—A white buoy marks the middle of the south edge of bank, abreast Off-lying rock. A red buoy marks the north e of Bower patch. Two white buoys mark the passage to g river, one being placed on the south-east extreme of North he other on the north point of East bank forming the south the passage, about one cable westward of the light beacon, if

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buoys are conical and numbered from 1 to 4 from seaward. Too much dependence must not be placed on the buoys maintaining these positions.

Pulo Trendah (North-west islet), 100 feet high, is small thickly wooded, and lies 5 cables distant from the north-west point of Great Dinding, where at three-quarters of a cable distant from the west side there is a rock having 3 feet water. Pulo Pélanduk, a small islet, 7 feet high, lies nearly midway between North-west islet and Great Dinding.

North point.—The shore of Great Dinding, between North-west point and North point, is bordered by a shallow flat, on which is situated Grasshopper islet, 120 feet high and wooded, about midway between the points.

Off-lying rock, 2 feet high, and half a cable in extent, lies East 2 cables from North point, with depths of 5 to 8 fathoms between.

Telok Dalam lies westward of Scorpion point. At its head there is a fishing village and a cocoa nut-grove. The bay is shallow, having only from 6 to 9 feet water on a line joining the entrance points. A spit extends about 2 cables eastward and northward of Scorpion point.

Charybdis rock, a pinnacle having a depth of 2 feet, lies $1\frac{1}{4}$ cables northward from Scorpion point. The ground is foul between.

Bower patch, having a depth of $2\frac{1}{2}$ fathoms, is about half a cable in diameter, marked by a buoy on its north side, and lies on south side of fairway, N. by W. $\frac{1}{4}$ W., distant 3 cables from Scorpion point. The summit of North-west islet, midway between North point and Off-lying rock, leads northward of Bower patch in 4 fathoms least water.

Table rock, 22 feet high, is situated one mile south-east of Scorpion point, and about one cable from the south point of Telok Chumpada, a shallow bight.

East bank commences at Mehegan point, south point of Dinding river, and skirting the shore for about one mile, trends to the westward and northward in a long narrow tongue, dry in places; the

See plan, No. 792.

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rth point of the tongue of 3 fathoms, immediately in the approach Dinding river, is marked by a light beacon, p. 158. From the acon, East bank skirts the mainland as far as Tanjong Katak ming the east side of Dinding channel. The depths on its edge ry from 3 to 15 feet, mud. There are numerous fishing stakes on it.

Anchorage.—Abreast of Pangkor village there is secure anchorage vessels of deep draught, and sufficient space for several vessels moor. A good berth is in 9 fathoms, mud, with the mouth of ngi Penang bearing about West, distant 2½ cables, and the same tance from the edge of East bank.

Bathing is unsafe on account of alligators.

Tides.—It is high water, full and change, in Dinding channel at . 15m.; springs rise 9 feet, neaps 5 feet. The flood stream comes m the northward, and sets fairly through at the rate of 2 to 3 knots springs. In Dinding river both the flood and ebb set at the rate 3½ knots at springs, and 2 knots at neaps.

South-westward of Great Dinding the flood sets south-eastward, d the ebb north-westward, and through the narrow passage tween pulo Pangkor Kechil and Great Dinding at the rate of 2 to knots at springs.

DIRECTIONS.—North entrance.—The North entrance is not commended for vessels of more than 18 feet draught, for although e channel is buoyed, and there is not less than 4 fathoms, yet the ssage is narrow, being only about one cable wide with that depth, d 2 cables wide with depths above 3 fathoms. As the buoys may out of position, the eye is the surest guide, when the sun is in a vourable position for showing up the shoals; due attention should paid to the speed of the vessel and to the set of the tidal stream.

Approaching the North entrance, the north peak of Great Dinding ould not be brought to bear southward of S.E., which leads well the westward of North bank. North-west islet will be sighted ead on this bearing, and passing it on the starboard hand at one ble distant, steer to pass half a cable northward of Off-lying rock, d between it and the buoy on North bank; then bring the summit North-west islet midway between Off-lying rock and North point. his mark astern will lead one cable northward of Bower patch, rked by a buoy, and one cable southward of North bank. When

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Scorpion point bears S.W., or being abreast of the white buoy at the south-east end of North bank, alter course to pass about 1½ cables eastward of Table rock, and thence, preserving the same distance from the island, to the anchorage recommended off port Pangkor.

If bound to Dinding river, still keep North-west islet midway between North point and Off-lying islet, and when Scorpion point bears S.W. sheer a little to the southward to give the buoy at the south-east extreme of North bank a wider berth, and bring the leading mark on again before the north end of East bank is approached. The extreme of East bank is marked by a beacon with light, *see* p. 158.

There is also a channel eastward of North bank; it may be approached by steering in for Tanjong Hantu bearing E. by S. ½ S., until 3 cables from it, thence S.S.E. ¾ E. to Dinding river entrance. This channel is suitable for vessels of 10 feet draught, but should not be taken without local knowledge.

South entrance.—From the southward, from between Fairway rock and pulo Katak, steer to bring Table rock nearly in line with Tanjong Hantu bearing N. by W. ½ W.; this mark will lead in mid-channel to the anchorage off port Pangkor. *See* view on plan.

If wishing to enter Dinding river, steer from the anchorage to pass Table rock 2 cables distant, and thence midway between East bank and the island, until the north summit of Great Dinding bears S.W. ½ S.; keep that mark astern until the summit of North-west islet is between North point and Off-lying islet, which leads over the bar in not less than 4 fathoms, northward of East bank beacon; thence proceed in mid-channel into the river and to the anchorage off the settlement of Lumut.

West anchorage.—Telok Nipah.—The west shore of Great Dinding is deeply indented, the depths in the bays however are comparatively shallow. On this side of the island, in Telok Nipah, sheltered from the southward by Long island, is fair anchorage in 4 fathoms, sand, 2 cables from that island. This anchorage is sheltered from all winds, except those from W.S.W. to North.

Between pulo Pangkor Kechil (Little Dinding island, which is 480 feet high, and one mile in length) and Great Dinding there

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)d holding ground in 3½ fathoms, at 2½ cables from the main
l, and with the north and highest peak of Little Dinding
ng W.S.W.

the south and west sides of great Dinding, without entering
ays, deep water will be found within a cable of the shore.

AIRWAY ROCK, 27 feet high, lies S. by W. ½ W. nearly
es from the south-east point of Great Dinding; a sunken rock
ıalf a cable from its north side. There are depths of 9 to
thoms between the rock and the mainland, and 10 to 20 fathoms
een the rock and Great Dinding.

OAST.—From Tanjong Katak (p. 157) the coast is low, covered
jungle, and forms a bight, in which are several villages, to the
nce of Pérak river, situated about 14 miles south-eastward of
Pangkor. Between Tanjong Katak aad Tanjong Kapak there
andy beach fronted by mangroves. The bight is skirted by a
which extends 2 to 5 miles from the coast, and nearly blocks
e entrance of Pérak river.

ERAK RIVER.*—The best navigable channel of Pérak river
he one always used, is the eastern channel, with 10 feet at low
; it lies near the north shore, at about 1½ miles westward of
ong Kapak and about the same distance off the shore of the bight.
iver inside is wide and deep, and navigable for vessels of 11 feet
ght as far as Telok Anson, about 30 miles up, and about 5 miles
Durian Sabatang by the river, and about three-quarters of a
by the road. Vessels of the draught mentioned can reach
n Sabatang, but the channel is difficult. Steam launches can
ed to Kota Lamut, about 5 miles beyond.

ward of the eastern channel the mouth of Pérak river is
nbered with flats, dry in places, and on which at times during
outh-west monsoon the sea breaks heavily. There is a passage
n as the Southern channel southward of these flats with a depth
feet at low water, over hard sand, but it is very narrow and of
e unless buoyed.

the flats may be liable to shift caution is necessary when
ng; also to avoid the numerous fishing stakes.

ak river takes its rise in Siamese territory, near the source of

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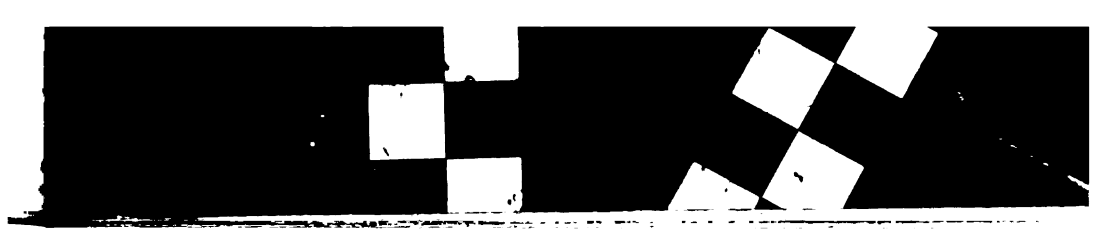

southward with many tortuous windings past Kota Tampan, Kota Lama, Kwala Kangsa, and other towns for about 100 miles to Durian Sabatang, from whence it takes a westerly direction to Malacca strait. The banks of the river are mostly low and covered with jungle.

Its chief importance arises from the tin mines of Lower Pérak and Kinta.

Pérak state, *see* p. 4.

LIGHTS.—From Denison screw pile beacon, on the east side of eastern channel of Pérak river, a *fixed white* light is exhibited at an elevation of 45 feet above high water, visible from a distance of about 8 miles. It is situated on the west edge of the one-fathom bank with Tanjong Kapak bearing N.N.W. $\frac{1}{4}$ W., distant $2\frac{4}{10}$ miles.

Within the entrance on the south side, abreast Tanjong Kupong, is Bagan Datoh light, exhibited from a white mast at an elevation of 50 feet above high water. It is a *fixed* light showing *red* seaward from the bearing of N. 70° E. to S. 21° E.; *white* from S. 21° E. to S. 70° W.; *obscured* from S. 70° W. to N. 21° W., and again shows *white* from N. 21° W. to N. 70° E. The white light is visible in clear weather from a distance of 8 miles and the red light 4 miles.

A buoy marks the north-east edge of the middle flats, in about 10 feet water, 4 cables south-west of Denison beacon light. The channel is between them.

Directions.*—From the northward, having passed pulo Katak, steer to bring the south point of pulo Pangkor nearly touching the north point of Pangkor Kechil bearing N.W. by W. $\frac{1}{4}$ W., which mark astern will lead northward of the outer fishing stakes, in 10 feet least water. The pile beacon should be steered for as soon as seen, bearing E.S.E. until within 2 cables of it, thence with Bagan Dotah light mast bearing S. by E. $\frac{1}{8}$ E. between the beacon and the white buoy.

Coming from the southward, the western island of the northern group of Sembilan islands, 262 feet high, should be brought northward of the eastern island of that group before bringing the mark above mentioned, astern.

The above bearing of Bagan Datoh light mast being kept on, will lead over the bar in about 10 feet at low water springs. The deepest water is on the eastern side of the channel; fishing stakes border both sides. Approaching Tanjong Kupong, keep westward of the

* Lieutenant Henry Belam, R.N., Admiralty Surveyor, 1884. *See* plan, No. 1,009, SO 11840

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ing given; and when the entrance is well open alter course
he river, keeping about 2 cables from the south shore until
the long shoal lying nearly in mid-channel, when cross over
keep the concave bank of the river to Kota Satia. (There is
nnel northward of the mid-channel shoal, but it is not usually
n by local traders.) The first reach in the river is the shallowest
ut 10 feet at low water) between the entrance and Telok Anson,
it 30 miles up.

ota Satia.*—There is anchorage off Kota Satia, in about 3
oms, mud, at about 2 cables from the shore. A bank of 6 feet
in mid-channel off Kota Satia, with the red tiled house bearing
it S.E. ½ E. It is to be observed that in most rivers deep water
be found in the bights or concave sides of the river and that
ls will be found off the points, which latter therefore should
iven a wide berth; also that the position of banks in the river
iable to alteration by the freshets.

eaving Kota Satia keep close to that shore until southward of the
-channel patch, then cross to the concave bank of the river;
n abreast the first point steer about mid-channel.

epth of 6 to 11 fathoms will be obtained in the channel between
Satia and Batú Rabit.

n arriving at Single-tree point, distinguished by a white board
ned to a tree just below Batú Rabit, give it a good berth, and
rounding it steer in for Batú Rabit, which will then be in sight
e bend on the left bank, but keeping the left bank on board until
irst point above Batú Rabit is neared, then sheer over to the right
until the point is rounded. Return again to the left bank and
it close on board until abreast the Cocoa-nut grove on that bank
e next bend, just below Telok Menintam, then steer across to the
osite bank for the white board on a tree, on reaching which steer
ss to a similar board on the left bank, and keeping that bank to
nd of that (Long) reach, where is the new settlement.

elok Anson,† the new settlement, is on the left bank of the
r, at three-quarters of a mile by a good road from Durian
tang, and 30 miles from the entrance to the river. It consists of
erous wooden houses with tiled roofs, a custom house and police
acks; the magistrate of the district resides here. Trade is

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carried on by Chinese, who supply the tin miners in the interior. Tin is the principal export, and is brought from the mines situated 60 miles up the Bídor river, and 6 miles from its banks. This river enters the Pérak at Durian Sabatang.

Communication.—There is frequent communication between this place and Penang and Singapore by coasting steamers.

Anchorage.—There is anchorage close off the settlement in 6 or 7 fathoms; a shoal extends from the opposite point nearly half way across the river.

Vessels do not usually proceed beyond this anchorage.

Durian Sabatang.—Beyond Telok Anson the channel to Durian Sabatang is difficult, owing to the narrow passage between the sandbanks and the absence of landmarks. The channel is close in to the right bank when clear of the shoal point abreast Telok Anson, until a small island is reached, and which must be kept close to on the port hand; when abreast an opening in the jungle, or one cable northward of the islet, the houses of Sabatang will be seen opening of Padamar point, when steer direct for the point allowing for tide, and keep close to that shore up to Sabatang.

Great care is necessary in making this crossing, the deep channel being very narrow, and the sandbanks on each side dry at low water. The least water found by the *Ringdove* (1875) in the channel at low water spring tides was 8 feet.

Durian Sabatang, formerly the settlement, and the highest point which may be reached by vessels drawing 11 feet, is about 35 miles from the entrance. Most of the former inhabitants have removed to Telok Anson, where all the trade is carried on. There is just room to moor off Durian Sabatang, but the place is now seldom visited.

Water is of indifferent quality, the best is obtained from a stream flowing over the sandbank opposite the village.

Tides.—It is high water, full and change, at the entrance to Pérak river at 3h. 15m., springs rise about 9 feet, and neaps 5 feet. The ebb runs about 2½ knots an hour. From January to March the tide falls about 2 feet lower than the average spring. The tide is 2½ hours later at Durian Sabatang, where the springs rise 12 feet; the ebb stream runs at the rate of 2½ to 3 knots, but the duration of the

See plan, No. 1,009.

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ms vary considerably, depending on the rains. The tides are
s far up as the entrance of Kinta river.
e water in Pérak river is fresh from 2 miles above Kota Satia.

esidency.—The residency is at Kwala Kangsa, some 72 miles
e Telok Anson, and on the right bank of the river, and about
niles distant from Thaipeng by road. *See* the railway from
k Anson towards Ipoh, about 12 miles eastward of Kwala
gsa, p. 3; the journey by the river is long and tedious. For
k state, *see* p. 4.

inta river, a tributary of the Pérak—Commander Singleton
rks that "returning on the 6th January 1875, from service with
e Naval Brigade at Kinta, the river was found to be greatly
ollen from the few previous days' rain, and the sandbanks,
ich there had been great difficulty in passing when going up,
d then sufficient water to allow of boats going over them. The
itish residency on the island off Bandar Bharu was entirely
oded, and the guns landed were entirely under water. The
er, which had risen at least 20 feet, fell suddenly about the
h January, and owing to the shifting bottom (fine sand), the
ire course was altered. The current on this occasion ran at the
e of 5 or 6 knots."

EMBILAN ISLANDS, lying to the westward of the entrance
érak river, occupy a space of 6 miles in a north-east and south-
direction; they are mostly small, bluff, high islands, covered
trees, steep-to, and may be seen from a distance of 20 miles.
e are some small sandy beaches on the larger islands, but landing
fficult on account of the reefs fronting them.
e northern group consists of four islets and a rock. The western
is 262 feet high, and the eastern 186 feet. In the southern
p there are six islands and two off-lying rocks. Pulo Rumbia,
feet high, the largest of the islets, has two peaks of nearly equal
ht; pulo Lalang, 388 feet high, is in two portions, joined by a
which dries at low water. Two islets, 80 and 20 feet high, lie
ward of pulo Lalang, and a rock which dries, lies 2 cables
hward of the southern one. Pulo Buluh, the southern islet,
feet high, has a flat top. Black rock, 8 feet high, and White
, 35 feet high, lie about 2 miles westward of pulo Rumbia and

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The edge of the bank of 3 fathoms which lies off Pérak river is about 5 miles distant from the nearest of the Sembílan islands.

At night the Sembílan islands should be approached with caution, as the depths are from 20 to 25 fathoms close-to and between them.

PULO JARAK lies near the middle of Malacca strait, about 26 miles westward of the highest Sembílan island in lat. 3° 59′ N., long. 100° 5½′ E. It is a precipitous, thickly wooded island, half a mile in length, east and west, nearly 3 cables in breadth, and 508 feet in height, and in clear weather is visible from a distance of 26 miles. It is steep-to except at the north-east extreme where boulders, some above water, extend nearly one cable off. The least depths are close off the north-west and south-east extremes, where there are about 20 fathoms.

Anchorage.—There is a depth of 24 fathoms at about 7½ cables northward of its west extreme, with a bottom of mud and broken shells where fair anchorage is obtainable; the depths elsewhere around the island are from 35 to 60 fathoms.

Tides.—It is high water, full and change, at 2h. 30m.; springs rise 7 feet. Tide rips were observed eastward of the island.

General directions.—During the north-east monsoon period, north and north-east winds frequently blow strong between pulo Jarak and the islands at the north end of Malacca strait; sailing vessels, therefore, from the southward during that period, should, after passing Dinding islands, keep near the edge of the mud flat which fronts the coast, so that they may not be delayed by the strong wind and short sea likely to prevail in the offing near Penang.

Vessels bound south-eastward should pass between pulo Jarak and the Sembílan islands, for the current often sets strong to the north-west in the middle of the strait, and calms are more prevalent there than near the coast; thence shape course to pass westward of North Sands and for One-fathom bank; *continued* at p. 184. If bound through Klang strait, *see* p. 171.

The COAST between Pérak river and Selángor river is low, covered with jungle, and skirted by a mudbank, on the edge of which a depth of 3 fathoms is found at from one to 5 miles off.

See chart, No. 793.

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shing stakes.—Enclosures for capturing fish, 30 or 40 yards re, consisting of bamboo, strengthened by cross poles, and having id platform well above the water, are situated off and along the t, a few miles apart. They are generally in about 5 fathoms r, rarely in less, and are therefore useful in pointing out where water is shallow. *See* also p. 29.

ERNAM RIVER.*—The entrance to this river is situated t 13 miles southward of the entrance of Pérak river. It is one e finest on the Malay coast, has 17 feet on the bar at high water, is said to be navigable for steam launches for about 100 miles; nags would then prevent further progress.

he 3-fathom edge of the shore mud bank extends 3 miles off the th of the river.

GHT.—A *fixed white* light is exhibited from a white light-e, at an elevation of 25 feet above high water, on the north point trance to Bernam river, visible about 4 miles.

rections.—The lighthouse can be distinctly seen at 3 or es distant, showing conspicuously against the dark green trees id. It should be steered for on the bearing of N.E. ½ N., which in the deepest water over the bar, passing between the fishing s.

the first reach, which is long and shallow, keep in mid-channel; follow the bends of the river, avoiding the points. The deepest is almost invariably close in to where the nepa palms grow shoalest where there are mangroves. The tidal streams run g in the river.

M.S. *Moorhen*, drawing 10½ feet, crossed the bar of Bernam in February 1877, and proceeded as far as the village of Sabah, 20 miles from the entrance. The vessel crossed at one hour e high water, had not less than 16 feet on the bar, and not less 17 feet, bottom soft mud, in the channel to Sabah, where she ed in 5¾ fathoms.

LÁNGOR RIVER (lat. 3° 20′ N.) has a depth of about t at high water springs in its entrance, and is nearly dry at low It is usually navigable for steam vessels drawing 8 feet to

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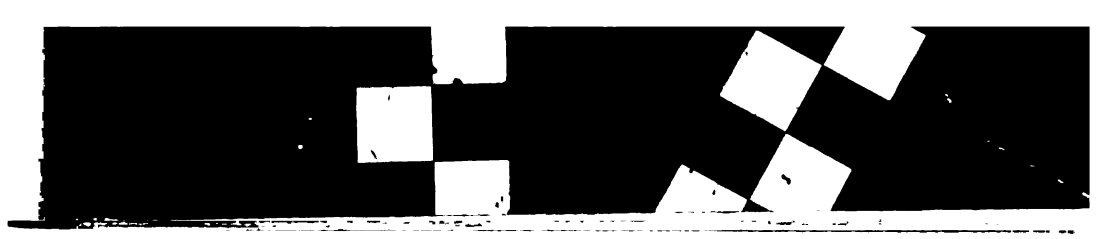

The entrance to this river may be recognised by Selángor hill, situated on the peninsula forming the south side of the entrance; the hill is high, conspicuous, covered with trees, and surmounted by a fort. The coast mud bank extends across the mouth of the river; its outer edge of 18 feet is about 3 miles westward of the entrance.

Settlement.—The magistrate resides in the fort on Selángor hill and the settlement is at the foot of the hill, about 3 cables within the south point of entrance; there is a Malay village on the opposite point. The population of the district (1890) is 6,100; revenue $90,000. The exports are tin, gutta-percha, gharuwood (lignum aloes), ivory, bark, hides, salt fish and rattans; the imports are rice, salt, opium, tobacco, tea, and oil. Tin is brought by boats from the mines up the river, and taken to Singapore by coasting steamers. (*See* also trade, p. 5.)

Beacons.—The best channel, with about 15 feet at high water springs, is marked by two rows of beacons, about one cable apart, surmounted by baskets, the outer one, white, being placed in 5 feet water. The beacons are white on port hand and black on starboard hand, when entering.

Light.—A *fixed white* light is shown from a small house in the fort, visible about 3 miles, but much hidden by trees.

Directions.—Vessels entering Selángor river should approach with the conspicuous tree on the south point of entrance bearing N.E. by E., thence passing between the black and white beacons and fishing stakes, and northward of the beacon marking the edge of the bank off the south point; thence steer for the village, about 3 cables within the point. The holding ground is bad, being very soft mud.

Selángor river is usually navigable for steam vessels of 8 feet draught, for 14 miles, or as far as Kampong Siar, as before stated, but there is little room to swing there. The bottom is soft mud. There is no danger in the river for a vessel of that draught, except a mud-bank with 3 feet water, situated about 3 or 4 miles from the entrance, off Telok Penjamon. Close to the shore on either side of the mudbank there is deep water. Above Kampong Siar there are several sand banks, but the river is navigable for cargo boats a further distance of 55 miles.

The river is tortuous in its course, and the deepest water is found

See chart, No. 794.

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e concave side. The banks are low throughout, and lined with
and mangrove trees.

les.—It is high water, full and change, at Selángor river at
springs rise 15 feet, neaps 12 feet. The flood stream runs five
, the ebb seven, at the rate of 5 miles an hour at times.

e COAST between Selángor and Klang islands is thickly
ed, low, and flooded in most parts at high water. It is skirted
e mudbank, already mentioned, which is dry at low water, and
ds 3 miles from the coast northward of Botel islets, gradually
ng the shore to the southward.

ANG STRAIT.—The northern entrance to Klang strait is
en pulo Angsa and the Botel islets. The southern entrance is
en pulo Klang and its outlying islets and pulo Lúmut. It is
ble for vessels of moderate draught.

strait is about 14 miles in length and in its narrowest parts
n a quarter to half a mile wide; the least depth is from
fathoms at low water, in the fairway. With the exception of
it extending from pulo Lúmut, at one mile south-west of Deep-
point, the banks are steep-to.

fords quiet and easy navigation, under the lee of the land, by
the North and South sands are avoided; but since the establish-
f a lighthouse on One-fathom bank much of the danger and
ties of this portion of Malacca strait have been avoided, so
lang strait is no longer recommended except for coasting
essels.

l or Bottle islets, a group of four, on the east side of
thern entrance to Klang strait, are situated on the coast mud
he outer one being 2 miles from the shore.

rock, half a cable in diameter, dry at low water springs, and
, lies three-quarters of a mile south-west from pulo Tekokoh,
h-western islet.

Angsa (Mudamus) consists of two islets lying 5 miles off
the west side of northern entrance to Klang strait. They
he eastern edge of the bank which extends about 16 miles

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Westward of pulo Angsa are the North sands, for which *see* p. 181.

Pulo Klang.—This island, with the mainland, forms the northern part of Klang strait, which is at this part one mile wide. The island is low and wooded, about 7 miles in length, and 4 miles in breadth. On the south-west side of pulo Klang, and extending 5 miles south-westward, is a group of five islands, the two largest of which form one side of Klang strait, and on the southernmost, named Pinto Gedong, is the light. All these islands are low, formed of black mud, and covered with mangroves. Pulo Klang, together with the islands mentioned, are situated on the south-east side of a mud-bank with depths of 3 feet to 2 fathoms, which extend 16 miles north-west and 6 miles south-west of pulo Klang. It breaks in places at times.

Pulo Lúmut is 9 miles in length, and forms the south-east side of Klang strait. Its north-west point is distant but 3 cables from Deepwater point, on the west side of the strait. A large Malay house stands on the south-west point of the island.

LIGHT.—From a white circular lighthouse, erected on pulo Angsa north islet, is exhibited at an elevation of 120 feet above high water, a *flashing white* light every *ten seconds*, visible in clear weather from a distance of 15 miles.

A *fixed white* light is exhibited at an elevation of 30 feet, from a wooden framework erected on the south-east extreme of pulo Pinto Gedong, forming the south-west point of entrance to Klang strait. It is visible from the southward in clear weather for the distance of 10 miles when bearing northward of E. by N. $\frac{3}{4}$ N.

Directions from the northward.—From abreast Selángor river bound through Klang strait, steer for pulo Angsa, when bearing South; this island may be approached close to on its eastern side, taking care not to approach the bank which lies north and west of that islet, to less than 6 fathoms. Between pulo Angsa and the south-west Botel islet the passage is $2\frac{1}{2}$ miles wide, and has depths of from 4 to 8 fathoms. From half a mile eastward of pulo Angsa, a S.E. course leads in the fairway to abreast pulo Klang.

When about 2 miles southward of Green point, the north-east extreme of pulo Klang, keep the eastern shore aboard, to clear the

See chart, No. 794.

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of 3½ fathoms which lies nearly in the centre of the channel; when southward of it haul over for Deepwater point to avoid the thoms patch lying close off the entrance to Klang river. Thence the left extreme of the south-west entrance point just touching right extreme of pulo Lúmut, a vessel will pass northward of the extending off the mouth of the creek on the Lúmut shore. The on the west side is steep-to, with some low bushes growing on nd is therefore scarcely a danger. Thence in mid-channel, ing about S.W. by S., passing about 2 cables off the light.

passing Deepwater point caution should be observed, as the streams set strong past the north end of pulo Lúmut.

Working into Klang strait from Selángor road, vessels should stand into less than 4 fathoms towards the shore, and homs towards the bank which lies to the westward. Botel ds should not be approached within one mile, the bottom being en, and there being a dangerous rock (Sail rock) lying three-ers of a mile south-west of Tekolo islet. When about 4 miles ward of Botel islets, the coast may be approached to within a mile, but in standing to the westward vessels should not ach the bank to less than 4 fathoms, and pulo Angsa should e brought to bear northward of N.W. Should a vessel, however, d here no damage will probably be sustained, the banks being t mud and the water invariably smooth.

om the southward.—When Parcelar hill bears about N. the entrance of Klang strait may be easily discerned, veral points appearing as bluffs, the most southerly of which nut point with a large Malay house on it; the framework hibiting the light on pulo Pinto Gedong on the western side of ait will also probably be seen.

light should be approached bearing about N.N.E. until about s distant, whence the mid-channel course is about N.E. by N. e the directions from the northward for the remainder of ait.

es and tidal streams.—It is high water full and change entrance to Klang river at 5 hours, springs rise about 14 feet.

he northern entrance to Klang strait, between pulo Angsa

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The flood makes at the time of low water at One-fathom bank, p. 183, and runs for 7 hours.

In Kwala Klang, approach to Klang river, the streams run from one to 2 knots per hour, the flood stream setting eastward to the river from 4 hours before to 2 hours after high water there.

Off Jugra river, southern approach to Klang strait, the flood sets S.E. and the ebb N.W. by W., at the rate of 1½ knots, turning at high and low water at One-fathom bank.

KWALA KLANG is the approach to Klang river from Klang strait. It is about 2 miles in length, by 3 to 5 cables in breadth, with depths of 6 to 10 fathoms within half a cable of its southern shore. Shallow water projects 1½ cables south-westward of the police station, east side of entrance to Klang river, and from the coast southward of it.*

Anchorage.—There is anchorage in about 6 fathoms, mud, about 2 cables south-westward of the police station. (*See* tides above).

It is contemplated to build wharves for the accommodation of shipping at Kwala Klang.

Police station.—At the east side of the mouth of the Klang, is the police station with a short pier available for boats at low water.

Lights.—Signals.—A small *red* light is shown from the mast near the police station at Kwala Klang; and a similar light on the wharves at Klang.

A signal mast, carrying a red ball is erected near the police office, Kwala Klang, and another at the wharves at Klang. The normal condition of the river is to be considered closed when the red ball on the signal mast will be at the yard-arm. A steam vessel approaching from seaward should sound her steam whistle as a warning to the signalman at the police station, and she may not enter the rivers until the ball is lowered from the yard arm. The same applies to the Klang station. The lights mentioned above takes the place of the ball at night.

KLANG RIVER.—The banks of Klang river for a distance of 30 or 40 miles in the interior are high and covered with mangroves

* *See* chart, No. 794, and plan of Kwala Klang, No. 2,153.

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arious sorts of palms. The river is from one to 4 cables in breadth, ree from danger for about 11 miles from the entrance, with a lepth of 6 feet at low water.

sels of about 12 feet draught can ascend to Bukit Kuda es above Klang. Vessels drawing 8 feet can proceed for a ce of 10 miles beyond.

ang.—The village of Klang, the head-quarters of the Col- is situated at about 12 miles from the entrance, and led by a fort on a hill. A spit extends about 20 yards off the below the fort at Klang, narrowing the channel to about rds.

legraph.—Klan is connected by telegraph with the ports in raits Settlements, and with the police station at Kwala Klang by one; and by rail with Kwala Lumpor, the capital.

harves have been built at Klang for the accommodation of s, and at Bukit Kuda 2 miles above.

ala Lumpor.—The capital of Selángor is distant 22 miles railway, and has a population of about 12,000. The British nt is stationed there.

de. (*See* p. 5.)

ections.—Klang river is approached by Klang strait, p. 170. abreast Deepwater point keep along the Lúmut shore of Klang to avoid the 2¼ fathoms shoal lying near the fairway of nce, steering for the police station (white) when bearing about E. When the west point of entrance bears N. ½ E., steer for it bearing to avoid the shallow water off the police station, until ion bears about East. It may be necessary to anchor south-west olice station, as vessels are not permitted to pass each other iver between the entrance and Klang town; the traffic being on the block system. (*See* signals, p. 173.)

oceed above the police station keep mid-channel and follow eral rule of keeping in the bends and avoiding the points. are is necessary in approaching Klang, as the channel is and the bends sharp; in the second bend below Klang the but 6 or 7 feet at low water; the spit off the pier below the t also be avoided.

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Anchorage.—Moor head and stern off the town, if there is not accommodation at the wharves, in 2 to 3 fathoms mud ; the holding ground is bad. The river here is from 80 to 100 yards wide, and there is not room to swing without touching the bottom at low water.

Lúmut strait.—The eastern side of pulo Lúmut is separated from the mainland by Lúmut strait, half a mile wide, in which the tidal streams run with considerable strength.

About half a mile south-westward of Tanjong Dalik, the north-east extreme of pulo Lúmut there is a bank in the fairway, which dries from one to 3 feet, hard sand. The channel is between the bank and the main ; thence southward a bank is charted nearly in the fairway ; it can only be navigated by small craft with the assistance of a pilot.*

LANGAT RIVER* has two mouths, one of which, the Langat, opens into Lúmut strait, the other, the Jugra, into the sea to the south-west of Parcelar hill.

In the Langat the turnings are sharp and numerous; a good look-out must be kept for snags, and the services of a pilot are necessary. At about 1½ miles inside the entrance, and extending nearly across, is a sandbank having only a depth of 2 feet; the deepest water is very close to the starboard bank of the river, on entering; mud banks have formed and are still forming (1890) in the river, and navigation is difficult for vessels over 6 feet draught. (H.M.S. *Teazer* and *Midge*, 1871–74, drawing 8½ feet, ascended the Langat to Langat town, about 13 miles from the entrance, and at its junction with the Jugra. The *Teazer* moored opposite the Sultan's palace, a Malay entrenchment having a few guns, and had room to swing only in one direction.)

Jugra river, the southern mouth of Langat river, enters the sea 10 miles south-eastward of Lúmut strait. This river has about 3 feet on the bar at low water, and 3 to 8 fathoms within, as far up as Parcelar hill, and was navigable (1890) for vessels of about 7 feet draught for about 10 miles. The shore bank extends 2 miles off the mouth of the river, is steep-to, and shoals suddenly from about 15 fathoms to 3 fathoms; it is usually marked by fishing stakes.

There is another channel to Jugra village, situated about 4 miles westward of the Jugra, named the Ayer Itam, said to be navigable

* *See* chart, No. 794.

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els of 7 feet draught at all times; this channel is marked ons on the port side, on entering.

t Jugra, or Parcelar hill, on the left bank of the Jugra 3 miles from the sea, is, when seen from the northward or rd, of an oblong shape sloping at both ends, but from the ard it appears conical. It is 915 feet in height, thickly , isolated, and being the only hill near the sea coast, is easily sed, and in clear weather may be seen from a considerable e.

at village is about 6 miles from the sea by the Jugra branch. village, about 2½ miles below, is situated at the foot of Parcelar The water is deep off Jugra village, and the granite face of ar hill comes close down to the bank. There is a police station good landing place. The District officer lives on the hill, palace of the Sultan of Selángor is on the eastern side of the ith a road leading to it from the landing.

GHT.—From an iron pillar painted white, erected on south of entrance to Jugra river, is exhibited a *fixed red* light, visible ar weather about 6 miles.

acons.—The bar of the Jugra river is marked by one beacon; Ayer Itam or western entrance is marked by beacons on the hand on entering, as before stated.

rections.—The entrance to Jugra river may be recognised by olice station and lighthouse on its south entrance point, and by elar hill. The latter kept on a N.E. by N. bearing leads up to ar beacon. The bar has a possible depth of 17 feet at high water ngs; but a depth of 14 feet only was found at that time by .S. *Fly*, in 1882.

ithin the bar the river is 200 yards wide, with depths of from 8 fathoms, as far as Parcelar hill, where several branches of the r unite, and where also there is anchorage. The tides in the river strong, and caution must be taken to avoid snags.

he COAST.*—Parcelar point is situated about 9 miles south- ward of Jugra river, and being round and similar to the adjacent st is not easily distinguished, but a little eastward of the point

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Sungi Sepang Besar, situated 15 miles south-east of Parcelar point, is navigable for craft of 6 feet draught, for a distance of 14 miles; the bar across its mouth has a depth of 3 feet at low water; within, the water deepens from 2 to 6 fathoms as far as Kankar, where there is a Chinese village.

The whole of the coast from Parcelar point to Sungi Sepang Besar is low, thickly wooded, and skirted by a sandbank which extends from a quarter to half a mile seaward.

Although no villages or huts are usually to be seen on the coast, yet it is inhabited by fishermen who apparently live a short distance from the beach, for smoke may constantly be seen rising all along the coast.

Sungi Lukut, it is said, may be entered at high water springs by vessels drawing 9 feet; steam launches can ascend about 5 miles, as far as Raja Bot house. At the mouth of the river is a village. There are two good fresh water streams in the bay on the east side of entrance of Sungi Lukut.

Between Sungi Lukut and Tanjong Kamúning is pulo Burong, a small islet skirted by rocks and surrounded by shallow water.

Off-lying shoals.—Bambek shoal is situated nearly midway between Parcelar point and cape Rachado, at 3 miles from the coast. The shoal dries near its centre, is composed of hard sand, and within a depth of 3 fathoms is 2 miles in length, in a direction parallel to the coast, and 7 cables in breadth; it is mostly steep-to, the water deepening suddenly to 8 or 10 fathoms within one cable. Between Bambek shoal and the coast, is a small bank of 3½ fathoms, with irregular soundings around it, and between this small bank and the coast there is a deep channel, one mile wide.

Westward of the north-west extremity of Bambek shoal are two banks of 7 and 10 fathoms, distant from the dry patch 2 to 4 miles and 6 miles, respectively.

Four miles eastward from the dry part of Bambek shoal, is the north-west extreme of a sandbank from a half to one mile wide, which extend nearly to cape Rachado; the bank is 9 miles in length, has a dry patch nearly in the centre, and depths of from 1½ to 5 fathoms over the remainder. Between the bank and the shore there is a channel about half a mile wide, leading to Arang Arang anchorage.

See charts, Nos. 794 and 795.

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ANG ARANG ANCHORAGE, or Port Dickson.*—
rang Arang, an island about 1½ cables in diameter, is situated
a quarter of a mile southward of Tanjong Kamúning; the
etween the reefs projecting from either side, is about 1½ cables
and is known as Arang Arang anchorage or port Dickson.
h it has only an average breadth of 1½ cables between, it
good anchorage in from 5 to 10 fathoms during the north-east
on period, and is said to be not unsafe in the south-west
on. The approach directly from seaward (south-westward)
ed by a sandbank which has a depth of 25 feet at low water
fairway over it. There is apparently deeper water along the
to the north-westward, but this channel has not been examined.

oals.—Buoys.—A coral patch with 3 feet least water, marked
north side by a red buoy, with 7 to 9 fathoms around it, lies in
proach to Arang Arang, with the centre of the island bearing
y E. ¼ E., and 3½ cables distant from its shore.

jong Kamúning and the coast eastward of it, is fronted by
w water, 3 fathoms and less, to the distance of one cable;
rang Arang to a third of a cable only, except to the eastward,
ch direction there is a shallow bank. Two red buoys mark its
rn side; the buoys are not to be depended on.

r.—Railway.—The pier at Arang Arang settlement, south-
de of Tanjong Kamúning, is 720 feet in length, 460 feet of
is masonry. the remainder of iron; it has a depth of 23 feet
de at low water, over a length sufficient for two ordinary
g steamers. It is connected by the railway with Seremban,
ital of the state of Sungi Ujong.

pier has an iron extension, with a depth of 7 fathoms at its
nd. Vessels can go alongside and discharge cargo into the
y trucks.

ding lights.—From an iron standard on the centre of the
—at 25 feet above high water, is exhibited a *fixed white* light

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From a wooden standard situated N. 57° E., distant 200 yards from the pier light, is exhibited at an elevation of 30 feet above high water, a *fixed red* light, visible about 4 miles.

Directions.—Approaching Arang Arang, from either northward or southward, keep cape Rachado lighthouse bearing southward of S.E. by E. ½ E. until the light beacons, or the lights at night, are in line bearing N. 57° E. These being steered for will lead over the sandbank in about 25 feet at low water, and northward of the 3-feet patch to the anchorage; anchor as convenient.

Tides.—It is high water, full and change, at Arang Arang, at 7h. approx.; springs rise 10 feet. In the harbour, the flood stream sets to the eastward and the ebb to the westward; but seaward of the 5-fathom bank, the streams set across the channel; the flood setting south-eastward from 3½ hours before until 2½ hours after high water by the shore, and the ebb north-westward.

Supplies.—A few fowls, and fish from the Malay fishermen, are obtainable; other supplies are brought from Singapore. Good water, however, is obtainable. The jungle abounds with life; tigers, deer, pigs, monkeys, argus pheasants, and several sorts of pigeons, but the jungle is so dense that little can be done with the gun.

Winds.—Sumatras blow home here in October and November. They seldom last more than a few hours, but they raise a little sea; it is, however, not considered dangerous to shipping.

TANJONG TUAN* or CAPE RACHADO is a steep bluff point, covered with trees and easily distinguished, as it is higher than the adjacent coast, and appears when first seen in the distance like an island. There is deep water a quarter of a mile distant. Near the cape there are two fresh water wells.

From cape Rachado the low woody coast of Sumatra, distant 20 miles, may be seen, the strait being here more contracted than at any other part northward of Malacca.

Tidal streams.—Off cape Rachado the flood sets S.E. by E., and the ebb N.W. by W. from 2 to 2½ knots; the south-eastern stream makes from 2 to 3 hours before high water at One-fathom bank and runs for 6 hours. (*See* p. 183.)

* *See* charts, Nos. 794 and 795.

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IT.—On cape Rachado, from a round tower painted white, high, is exhibited at an elevation of 388 feet above the level sea, a *fixed white* light visible from seaward between the s of S.E. by E. and N.W. by W. In clear weather the light be seen from a distance of 26 miles. The limit of the light orthward passes over the centre of Bambek shoal, and touches r point; and the limit of the light to the southward leads nile south-west of Diana rock.

ANDS and DANGERS near the fairway.—AROA NDS* are a group of small islands lying nearly in mid-channel n Sumatra coast and the North sands, spread over a space 9 miles in extent. These islands are situated on a bank 10 fathoms, the northern end of which extends 6 miles north-rd of the islands; the southern joins an extensive mudbank t to the Sumatra shore. Aroa bank is steep-to on the north, nd west sides, the depths suddenly increasing to 18 and oms.

tion.—Much care is requisite in approaching Aroa islands the night as many of them are low, and difficult to see after

th rock, the northern islet is small, about 15 feet in height, rrounded by a reef.

Jemur (Long Aroa), lies nearly 3 miles south-west from rock; it is two-thirds of a mile in length, 400 yards in breadth, d covered with trees, from 80 to 90 feet in height. At 2 cables ast of Long Aroa are two small islets nearly joined, and a reef of rocks which extends three-quarters of a mile north-them.

y fishermen sometimes visit Long Aroa to fish and procure in the season. There are three huts and a small spring of ater in Long Aroa, but not sufficiently large to water a vessel In and after the rainy season, or to about the end of the year, ity of water may be obtained, there being in the island several tanks; these dry in the hot season. The best watering place he western side, which is clear, and a vessel may anchor close

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Batu Ma
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Tides.—F
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Western Aroa, a group of islets from 85 to 90 feet in height, three-quarters of a mile westward of Long Aroa, are five in number namely Tekong Mas, Pulo Rendang, Pasir Panjang, Labuan Biti, and Tekong Chama, occupying a space of 1½ miles; they are all connected by a reef nearly dry at low water and extending half a mile N.N.W. of them.

Batu Balia, a group of six rocks 3 feet high, surrounded by a circular reef, is half a mile in diameter; they lie about 3 miles eastward of Long Aroa.

A rock which dries at half ebb and is steep-to, lies 1¾ miles eastward of Batu Balia.

Batu Mandi or East rock, 6 feet high, lies about 7 miles eastward of Long Aroa, with depths of 16 to 18 fathoms within a short distance.

Tekong Simbang or Round Aroa, is 95 feet high, precipitous, and the highest of the Aroa group; its summit is covered with trees and may be seen from a distance of 15 miles. There are several rocky islets around it. Round Aroa with its outlying islets occupy a space of 1¾ miles north and south, and three-quarters of a mile east and west; the southern islet, Pulo Tekong, is 30 feet high.

Tides.—From observations extending over a few days in November, 1893, the north-east monsoon period, it was found to be high water at the Aroa islands (Round island), at 6h. approximately, springs rise 14 feet, neaps 9 feet. Off the islands, at springs, the flood sets south-east, about 2 knots, making from 4 to 5 hours before high water by the shore, and running until one to 2 hours after. The ebb sets north-westward about 3 knots. At neaps, the south-east or flood stream being overcome by the prevailing north-west current, was not felt until about 3 hours before high water, ceasing about 2 hours after high water.

NORTH SANDS comprise various sandbanks and spits extending from the Malay coast between Selángor river and Parcelar hill towards the Aroa islands. The sandbanks have a general north-west and south-east direction, with depths of 6 to 20 fathoms water between them. The north-west extremity of the Sands is on the parallel and 25 miles west of Bukit Jeram, situated six miles southward from

See charts, Nos. 794 and 795.

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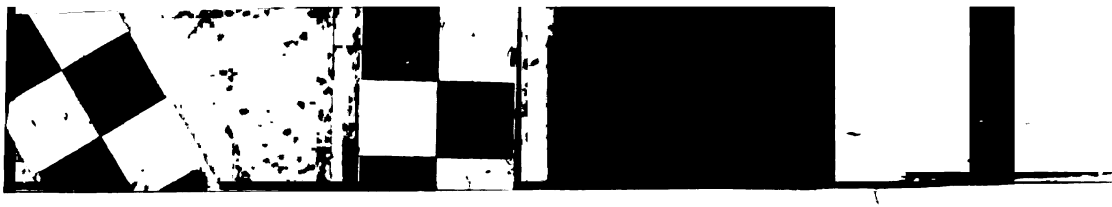

r ; a narrow strip of sandbank, having depths varying from ns to nearly dry, extends thence in a south-easterly direction .ce of 12 miles.

ı Kinching.—The southern portion of the North sands is Batu Kinching, and has a dry spot about one mile from its n end. These banks and patches are usually discernible from distance during daylight.

ıheim shoal, having 4 feet least water, is about 2 miles in lies 5 miles south-west of Batu Kinching, and about 11 miles ard of One-fathom bank lighthouse.

ks.—A bank with 2½ fathoms lies between Blenheim shoal and Kinching. At 8 miles eastward of Blenheim shoal is a bank in length, with 7 feet least water. Five miles southward of im shoal, in the direction of One-fathom bank, is a patch of oms, and 3 miles south-east of this, is a patch of the same Between Blenheim shoal and the banks just mentioned, and t extending northward from pulo Klang, are other shallow the position of which will be seen on the charts.

E-FATHOM BANK, on which there is a lighthouse, lies on tern side of the fairway of Malacca strait. Within the depth thoms it is one mile in length. North-eastward and south-ard of the bank the depths increase quickly to 10 and oms. North-westward the bank extends 8 miles, with depths 8 fathoms. (*See* tides, p. 183.)

tch of 3½ fathoms lies about 8 miles south-westward from the ouse, on the opposite side of the fairway.

HT.—An iron screw-pile light tower, painted in bands of red ate colour, is situated near the eastern edge of One-fathom From it is exhibited at an elevation of 50 feet above high a *revolving white* light, which attains its greatest brilliancy *minute*, and in clear weather should be visible from a distance niles.

ell is sounded in thick or foggy weather.

nnels.—There is a deep channel between the bank which

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it, as no bearings can be given to direct them. Coasting vessels use this channel, keeping on the edge of pulo Klang bank in 4 to 5 fathoms.

The channel between the north-west extreme of North Sands and Aroa islands is deep ; the deep water extending to within 5 miles of North rock of the Aroa islands, and close to East rock.

SOUTH SANDS are of similar formation to North Sands, and extend across with but little interruption to the Sumatra coast. The neighbourhood of South Sands may be considered for sailing vessels as the most dangerous part of Malacca strait, there being no near objects from which bearings can be given for vessels working through, to clear the dangers.

The eastern edge of South Sands forming the western side of the navigable channel through Malacca strait extends about 40 miles in an E.S.E. direction, from a position 7 miles south of One-fathom bank, and distant from the Malay coast from 12 to 15 miles. The northernmost shallow head, of $2\frac{3}{4}$ fathoms, lies $10\frac{1}{2}$ miles S. by E. $\frac{1}{2}$ E. from One-fathom bank lighthouse.

Pyramid shoal, the eastern extreme of the South Sands chain, is the most dangerous, standing out beyond the others a distance of 4 miles nearer the track of vessels. The shoal is about one mile in length, with one fathom least water, bottom hard sand. Bambek shoal, the nearest danger on the other side of the fairway track, lies 12 miles north-eastward from it ; Rachado light bearing E. by S. leading about two miles northward of Pyramid shoal.

Tides and Tidal streams.—It is high water, full and change, at One-fathom bank at 6h. 15m., springs rise 14 feet, neaps 10 feet. During springs the streams within from 10 to 15 miles of One-fathom bank are regular, the flood running about S.E. at the rate of $1\frac{1}{2}$ to $1\frac{3}{4}$ knots and the ebb N.W. about $2\frac{1}{2}$ to 3 knots, turning very nearly with high and low water

Near the northern and central parts of the South sands the streams are tide and half tide ; one stream setting S.E. by E., at the rate of $1\frac{1}{4}$ knots, from 3 hours before to 3 hours after high water ; and the other stream N.W. about 2 knots, for a similar period.

Near the southern part of South sands they make one hour earlier the velocities being about the same. There is an interval of slack

See charts, Nos. 794 and 795

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times, but at others the stream continues running the whole
dually changing its direction. It rotates in either direction,
dependent on the wind.

otions.*—Vessels from the northward should make One-
lighthouse bearing about E.S.E.,† and passing about 3 miles
d and southward of it, should then haul to the eastward
Parcelar point, passing it at the distance of 5 miles; main-
this distance off shore will clear Bambek shoal, as will also
o lighthouse, bearing S.E. by E. ½ E., or more eastward.
vessels working to windward should not stand farther off the
an 10 miles, nor nearer inshore than 3 miles when between
chado and Bambek shoal. The depths near the banks are so
r that they afford no guide as to the proximity of those
.

ight.—Vessels should keep Rachado light bearing eastward
by E. ½ E., or the light in sight showing brightly, to avoid
shoal.

ST.—LINGI RIVER.—The entrance of this river is
7 miles to the eastward of cape Rachado; the coast between
ed by a mudbank which extends off the bight westward of
alámat a distance of 1¼ miles.

iver forms the western boundary of the British possession of
, and is navigable for vessels of 8 or 9 feet draught as far as
ng, about 5 miles from the mouth, and for large boats for 4 or
beyond. At Sempang, where there is a police station, the
es 9 feet at springs.

i river is the principal trade outlet for the protected state of
Ujong. (*See* p. 5.)

horage.—There is good anchorage off the entrance in
oms, mud, with Rachado lighthouse bearing W. by N. ½ N.,
ukit Salámat N. ¾ E.

dmarks.—A police station stands on the east point of the
nd a tree (whitewashed) marks the west point.

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tinued from p. 167. *See* charts, Nos. 794 and 795.

ths of 8 and 8¼ fathoms, sand and shell, were reported by the s.s. *Pekin* in

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Chap. III.]

A beacon

Batu Ma
entrance of

Batu Ter
E.S.E. from

Banks, w
Tengah, at th

Direction
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3 cables off
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Tanjong
low project

A beacon marks the rock situated between the entrance points.

Batu Mandi, a rock awash lying 1½ miles south-west of the entrance of Lingi river, is marked by a beacon.

Batu Tengah are three rocks just above water, lying 2 miles E.S.E. from Batu Mandi.

Banks, with 12, 9, and 11 fathoms, lies south-westward of Batu Tengah, at the distance of 2, 3, and 6 miles, respectively.

Directions.—The river should not be entered without a pilot, who may be procured at Malacca. The bar, with rocks on either side, has a depth of 12 feet at high water springs. The beacon rock in the entrance covers when there is a depth of 10 feet on the bar. From off the entrance the course is about N.E. by N., passing about 3 cables off the eastern point of the river, until the whitewashed tree bears E. by N., when it should be steered for until a conspicuous clump of trees is in line with the rock beacon in the entrance. From this position a solitary hill will be seen over the river, which should be steered for, passing about 50 yards or less northward of the beacon rock, as the water shoals rapidly from 7 fathoms, to 3 or 4 feet westward of the north point; thence there appears to be no difficulty in proceeding to within half a mile of Sempang, where there is anchorage in 4 fathoms, with plenty of room to swing.*

The COAST.—From Lingi river the coast takes a south-east direction for 15 miles to Tanjong Kling. It consists mostly of irregular rocky points with occasional small sandy beaches.

Diana rock, always above water, and one mile from the shore, lies nearly 16 miles south-eastward from cape Rachado lighthouse, which light is obscured when within half a mile of the rock. Inshore of Diana rock there are several other rocks; a sandy ridge of 3½ to 5 fathoms, lies between a half a mile and 2½ miles north-west of the rock.

A shoal head of 2 feet lies 1¼ miles south-eastward from Diana rock, and one mile off Tanjong Panchur. Several islets and a sunken rock also lie within half a mile of this point.

Tanjong Kling, the north-west boundary of Malacca bay, is a low projecting point of land covered with high jungle; there is a flagstaff on it.

* H.M.S. *Foxhound*, 1879, in charge of a pilot. *See* chart, No. 795.

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shoal of small extent, of coral, with a depth of 2 fathoms and to, lies with the flagstaff at Tanjong Kling, bearing N. by E. ¾ E., 5 cables. Another shoal is said to lie north-west of it. The should be given a berth of at least one mile.

LEIGH SHOAL, of 3½ fathoms, is about half a mile in , and lies S. by E. distant 18 miles from cape Rachado, and s from pulo Rupat on the Sumatra shore. The shoal is steep-to north side, but on its other sides 4½ and 5 fathoms will be within half a mile. A bank of 12 to 15 fathoms extends 8 to 10 miles in a north-west direction from Raleigh shoal.

LACCA.—The town is built on both sides of the small of that name, and connected by several bridges; it is the seat vernment of the British settlement of Malacca, and a free (*See* anchorage, p. 188.)

he left bank of the river is St. Paul's hill, surrounded by the ns of an old fort. On the summit of the hill stands the ruins ancient church of Our Lady del Monte also, the lighthouse gstaff. Around the base of the hill lie the high school, court church, hospitals, post office, harbour master's office, and public buildings.

ttle to the south rises the hill of St. John, and in the rear of it St. Francis; on these eminences are the remains of batteries l by the Portuguese and Dutch; smaller knolls intervene d with extensive Chinese cemeteries.

country a few miles inland is formed of undulating hills, ately elevated, named Malacca hills, and 20 miles E.N.E. of is Gunong Ledang or mount Ophir, having a triple peak, feet high; the coast and land adjacent to the town are low and d.

ition.—The Colonial trigonometrical station on St. Paul's hill, eastern end of the ruin, deduced by telegraph from Singapore, ngitude 102° 15′ 0″ E.

pulation. (*See* p. 6.)

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Trade.— hides, rattan Once a grea sense, a me to that port

Supplie master; an obtained. steam launc

Repairs forging fac cylinders o is a small of 450 H.P. 14 tons.

Commu Singapore a communica (*See* p. 3.)

Malacca low water, about one r channel ov river at al bridges, co

A pier, to the river

LIGHT tower 90 f sea a *fixed* bearing of From th 15 feet abo

Trade.—The chief exports comprise tin, rice, pepper, nutmegs hides, rattans, &c.; the proportion is small compared with Penang. Once a great trade centre, the town has become, in a commercial sense, a mere suburb of Singapore, most of the produce being taken to that port for shipment. (*See* also pp. 2, 3.)

Supplies.—Water is obtained on application to the harbour-master; and poultry, fish, yams, and a variety of fruits may be obtained. A small quantity of coal is kept for the Government steam launch only. There is a Government hospital for all classes.

Repairs to engines are undertaken at Malacca. There are no forging facilities, but shafts of 15 inches diameter can be turned, cylinders of 62 inches bored, and castings of 8 tons made. There is a small steam hammer (5 cwt.) and numerous lathes. Engines of 450 H.P. have been repaired. There is a crane capable of lifting 14 tons.

Communication.—Malacca is in telegraphic connection with Singapore and Penang by submarine cable. There is constant steam communication with the other parts of the Straits Settlements. (*See* p. 3.)

Malacca river.—The entrance to Malacca river is nearly dry at low water, being obstructed by a bank of soft mud, which extends about one mile from the shore, with 18 feet on its outer edge. The channel over the bar is marked by stakes, and boats can enter the river at about a quarter flood. The river is spanned by several bridges, connecting the town.

A pier, 1,200 feet in length, extends off the east point of entrance to the river, with a depth of one foot at low water at its extreme.

LIGHTS.—On the summit of St. Paul's hill, from a white square tower 90 feet high, is exhibited at an elevation of 180 feet above the sea a *fixed white* light, visible in clear weather seaward, between the bearing of N.W. and S.E., from a distance of 12 miles.

From the pier head at Malacca is exhibited, at an elevation of 15 feet above high water, a *fixed* light showing *red* to seaward and *white* inshore, visible in clear weather from a distance of 7 miles.

MALACCA ROAD.—Islets.—Pulo Upeh, situated 2¾ miles westward of Malacca town, and 1¼ miles from the shore, is about a

See chart, No. 795.

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of a mile in extent, and situated on the outer edge of the
ık which skirts the shore ; the islet is 7 feet in height,
:overed with trees and easily discerned. A patch of 18 feet
ut half a mile southward of the east point of the islet.

ght, vessels should not approach this islet to a less depth than
oms.

Java, or Red island, is composed of two islets nearly joined.
out 4 cables in extent, and lies three-quarters of a mile south-
the river, and on the edge of the mudbank. There is a red
eacon with iron cage on the islet, situated 2 cables seaward of
va.

Panjang, a narrow rocky flat half a mile in extent, lies
one mile south-south-eastward from pulo Java, and about the
istance off shore ; it is steep-to on its south side, but on the
ide the water is shallow.

stone beacons with iron cages mark the east and west extremes
Panjang.

horage.—The best anchorage in Malacca road is in about
2 fathoms, with the fort bearing N.E., and about 2 miles off
or with pulo Anyut and pulo Undan in line bearing S.E. The
ms contour line is about 1½ miles off shore, beyond which the
increase somewhat quickly to 8 and 10 fathoms. Under a
of 10 fathoms the bottom is chiefly mud ; exceeding that depth
tiff clay. On the east side of the road the bottom is rocky.

l vessels may lie closer in, with Tanjong Kling just open
pulo Upeh, and the flagstaff N.E. The depth here is
oms, mud, at low water springs.

sea-worm in these waters is destructive to vessels or boats not
copper sheathing.

es.—It is high water, full and change, in Malacca road a
n. ; springs rise 11 feet, neaps 8½ feet.

al streams.—The tidal streams sets S.E. by E. at the rate
knots from 3 hours before to 3 hours after high water at
hom bank (p. 183). For the remainder of the 12 hours it

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Winds.—
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Winds.—Malacca road is neither visited by the hurricanes of higher latitudes, nor is it within the influence of the monsoons of the adjacent seas; but during the period of the south-west monsoon sudden hard squalls frequently blow into the road from the Sumatra side in the night, accompanied with lightning, thunder, and rain. These winds, called "Sumatras," generally commence to blow at seven or eight in the evening, and attain their greatest strength at midnight. (*See* p. 20.)

Directions.—Malacca road is included in the space lying seaward of a line joining pulo Upeh and pulo Panjang, and is a safe anchorage. In approaching from seaward, the first objects that strike the eye are a cluster of trees crowning the summit of St. Francis hill, the lighthouse and ruined church on St. Paul's hill, and the white edifices which, skirting its base and extending along the seashore, are gradually lost in the thick groves of cocoa-nut trees which cover the dwellings of the Chinese and Malays. In the background rise the Malacca hills, and in the distance the triple peak of mount Ophir.

The road may be safely approached, as there is no sunken danger beyond the mud bank skirting the shore, except the 3-fathoms patch lying half a mile southward of pulo Upeh.

Vessels approaching from the southward at night will make pulo Undan light, and passing southward of it, and westward of pulo Anyut will then bring those two islands in line astern, or the light bearing S.E., which will lead to the anchorage, and well clear southward of pulo Panjang. Pulo Undan light will also be seen when approaching the road from the northward.

WATER ISLANDS are a group of six, lying south-eastward of Malacca. Pulo Undan, the outer island, lies about 10 miles south-eastward from Malacca lighthouse, and 5½ miles from the shore. The islands are of moderate height, round, and covered with trees. Inshore of pulo Besar, the largest, the bottom is foul and rocky, but between the others there are depths of 10 to 20 fathoms. A shoal with depths of 2 to 3 fathoms extends one mile north and north-west of pulo Besar, between that island and pulo Serimbun. The channel between pulo Dódol and pulo Besar has a rock of 1½ fathoms, nearly in mid-channel.

Water.—On pulo Besar there are said to be several wells of good water.

See chart, No. 795.

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:T.—On the summit of pulo Undan, from an octagonal red ing from the centre of a square two-storied white building, ted at an elevation of 155 feet above the sea, a *group flashing* ht, showing *two flashes every thirty seconds* in the following Flash of *two and a half seconds*' duration, eclipse of *five* flash *two and a half seconds*, followed by an eclipse of *econds*; the light is visible from a distance of 20 miles in ather.

ROY BANK lies on the western side of the main channel Malacca strait, and abreast the Water islands. Within a 6 fathoms the bank is about 6 miles in length. The shoalest one fathom, on its eastern end, lies with pulo Undan light-earing N.E. by E. ¼ E. distant 17½ miles. Shoal heads of 2 to ns extend thence about 3 miles in a north-westerly direction, ng to 5 and 5½ fathoms for a further distance of 2½ miles, n to 12 and 14 fathoms. On the north and south sides the nearly steep-to.

al head of 4½ fathoms lies 8 miles S.E. by E. ¾ E. from the hom patch on Rob Roy bank. This head is the centre of a ridge 6 miles in length, having depths of 5 to 8 fathoms, idge continues about 11 miles farther to the south-eastward, pths of 9 to 15 fathoms.

COAST between the town of Malacca, and Tanjong Segenting ount Formosa, a distance of 45 miles, trends south-eastward, two bays; it is low, thickly wooded, and skirted by a mud hich extends in some places 2½ miles off, and in the bight Water islands and Moar river to 4 miles from the shore.

or Muar river, enters the strait at about 15 miles east-Water islands, and its lower portion is the boundary between and Johor; the entrance is narrow, and on account of the flat which extends off its mouth, is only navigable by small The bar is said to have a low water depth of one fathom but within it is wider and deeper.

river is the longest in Johor province, and one of its tributaries pole, is separated from the Serting river by a strip of swampy y 450 yards wide. It is therefore easy to drag canoes from

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joins the Great Pahang river, canoes can make the passage from Malacca strait to the China sea.

Town.—Bandar Maharani, situated on the east side of entrance to the Moar river, is the second in importance in Johor province, and has about 5,000 inhabitants.

Communication.—There is a constant steamship communication with Singapore and Malacca, and small steam craft navigate the river for a distance of 60 miles; the district possesses good roads.

A light railway connects the town with Padang (Parit Jawa) about 8 miles south-eastward, and the centre of a very fertile agricultural district. The banks of the river are thickly settled by Chinese gambier and pepper cultivators as far as Bukit Kepong, a large village 70 miles up stream.

Residents.—The Sultan of Johor is represented at Bandar Maharani by a Resident. A British Resident for the Negra Sembilan States resides at Kwala Pileh on the Upper Moar. (*See* description of the States, p. 5.)

Bukit Moar is an isolated thickly wooded hill 5 miles south-eastward of the river entrance, and is visible from Malacca road in clear weather.

Tanjong Tohor is a low projecting point of land, covered with jungle, at 10 miles south-eastward from Moar river, and a useful mark for clearing Formosa bank.

FORMOSA RIVER or **Sungi Batu Pahat Sembrong** is fronted by a shallow flat, extending 3 miles off, with only a depth of one foot at low water near the entrance. Within the entrance there is deeper water, and it is probably navigable for light draughts or boats for many miles; at 6 miles up it forks.

The eastern branch takes its rise in a swamp, close to the source of the Sungi Sembrong Indau which discharges into the China sea. The town of Pengkalan is on this branch about 14 miles from the sea. The Chinese gambier and pepper cultivators are settled in large numbers on these streams.

Mount Formosa, 1,560 feet high, is the summit of a range of undulating hills, which terminate at Tanjong Segenting. Pulo Sheilo is the small island about a cable from the coast, westward of Tanjong Segenting.

See chart, No. 795.

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rmosa bank, off Formosa river, is six miles in length in a -west and south-east direction, 3 cables in breadth, with depths m 2 to 4 fathoms, hard black sand.* The east end of the w part of the bank lies with mount Formosa bearing N.E. ½ E., ½ miles off Tanjong Segenting; a ridge with depths of 5 to homs extends 7 miles north-west of the west extreme of the

e COAST* from mount Formosa to Tanjong Bulus, a distance miles, is low and thickly wooded, and abreast pulo Pisang forms t 3 miles deep; it is fronted by a shallow mudbank to the dis- of one to 2 miles, except between pulo Pisang and pulo Kokob, it extends nearly 6 miles from the coast. Several creeks empty selves into the sea in this tract of coast. Within a line joining ng Segenting and pulo Pisang, the bottom is uneven, there patches of 3½ and 4 fathoms, with 6 to 8 fathoms close-to; s therefore should keep seaward of the line.

des.—It is high water, full and change, from 8h. 30m. off mount osa, to 9h. 30m. off Tanjong Bulus; springs rise 10 to 11 feet, 7 to 8 feet; the south-eastern stream runs from 2 to 3 hours e high water to two or three hours after high water.

ULO PISANG is one mile in length, and covered with trees. island is 7 miles from the coast, 19 miles north-westward njong Bulus, and may be seen from a considerable distance in weather.

spit about half a mile wide, steep-to, and having a depth of only near its extreme, extends 5 miles in a S.E. by S. direction pulo Pisang. A bank having depths of 3 to 4 fathoms extends es north-west of pulo Pisang.

GHT.—From a lighthouse 40 feet high, built of red brick, and a white lantern, erected on the summit of pulo Pisang, is ex- d at an elevation of 510 feet above the sea, a *flashing white every five seconds*, and should be visible in clear weather from nce of 30 miles. It is visible over pulo Kokob.

IR CHANNEL BANK, a long and narrow bank stretching hole distance between Formosa bank and pulo Pisang, is steep-to,

See chart, No. 795.

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rings have been made on Formosa bank with the object of finding a site for a

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Caution.—
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tides, p. 192.)

and has general depths of 9 to 12 fathoms; a patch of $4\frac{3}{4}$ fathoms lies 5 miles from its south extreme, with pulo Písang bearing E. $\frac{1}{4}$ N. distant 7 miles.

Long bank lies on the southern side of the fairway, and is of a similar character and parallel to Fair channel bank, but shallower.

The western extreme of the shallow portion, which has from $2\frac{3}{4}$ to 5 fathoms over a distance of about 18 miles, lies nearly 16 miles due south of Tanjong Segenting. It is steep-to on its north and south sides.

Westward of Long bank are numerous similar banks extending to within a short distance of the banks fringing the Sumatra side of the strait. It would be perplexing to the seaman to give any further description of these banks, the best idea of them is to be gained by studying the chart.

Pulo Kokob is a low flat wooded island 2 miles in length and $1\frac{1}{2}$ miles in breadth, lying within the edge of the coast bank at 6 miles westward of Tanjong Bulus, and separated from the coast by a narrow passage. The trees on the north-west side are of a bright green colour, and at the south-east end they are tall erect poon trees, like those on the adjoining coast.

Tanjong Bulus, the south point of the Malay peninsula, is a broad tongue of low land having high trees on its western side and low bright green mangroves to the eastward. All the adjacent country is low with the exception of Gunong Pulai, an isolated mountain, 2,220 feet high, situated 20 miles northward of the point.

The mud bank dries at low water to the distance of one mile south of the east part of the point, and is fairly steep-to.

Caution.—In passing Tanjong Bulus and pulo Kokob, caution must be exercised, as the eastern stream sets strongly towards the bank. Similarly, the western stream sets towards Long bank. (*See* tides, p. 192.)

See chart, No. 795.

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CHAPTER IV.

SINGAPORE STRAIT.

VARIATION IN 1896.

Singapore strait ... ... 2¼° E.

neral description.*—Singapore strait is bounded on the by the Malay peninsula and Singapore island, and on the south he Bulang archipelago, and the large islands of Batam and ng or Bentan. The entire length of the strait is about 60 miles. readth, at the western entrance is about 10 miles, and at the rn entrance about 20 miles, but southward of Singapore, een the islands and the main channel of the strait, is barely es wide.

ing to the many sunken dangers in Singapore strait, its navigation formerly attended with much difficulty and anxiety, but such ceased to be the case since the erection of Raffles lighthouse Coney island, Horsburgh on Pedra Branca rock lighthouse, n shoal lighthouse, and other lights and beacons. With common tion the strait can now be navigated either by day or by night.

r the sake of convenient reference it has been thought best, in ribing this strait, to divide it into four portions, viz., Singapore , western part; Singapore New harbour, town and road; apore strait, eastern part; and Old strait of Singapore.

SINGAPORE STRAIT.—WESTERN PART.

OUTH SHORE.—Pulo Angup or Tree island, is the n-westernmost of a group of islands about 5 miles in extent, ing the southern side of Singapore Main strait. The islet, half

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In passing northward of Tree island, Raffles lighthouse should not be brought to the northward of East, which bearing will keep a vessel one-third of a mile northward of the reef extending from that island.

Kent rocks, between Red and Tree island reefs, lie north-west and south-east from each other, nearly half a mile apart and are steep-to. From the southern rock, the larger of the two, which has a depth of 2½ fathoms, the east extreme of Long island is in line with the centre of Red island, the latter distant $1\frac{4}{10}$ miles. The northern rock is about 15 feet in length, with 6 feet water. The positions of these rocks are usually marked by tide rips.

Pulo Palampong, or Red islet, is simply a rock 20 feet high, covered with trees, lying $2\frac{3}{8}$ miles eastward of Tree island. The reef which surrounds Red islet extends about 4 cables off the north-west side of it.

Two detached reefs lie in a south-westerly direction from Red islet, the outer and larger being distant nearly 1½ miles.

Tekong Besar, or Long island, 115 feet high, and lying three-quarters of a mile south-east of Red islet, is similarly surrounded by reefs, with a rock above water off its north end.

Tekong Kechil, or Round island, is a small but elevated island, lying half a mile south-east of Long island, surrounded by a reef to the distance of a quarter of a mile.

Long island and Round island are also known as the Brothers, both being covered with trees.

Phillip channel lies between Long and Round islands to the north-westward, and the numerous islands fronting Batam and Bulang islands to the south-eastward. It is free from danger, with good anchorage, and is a short route for vessels proceeding to or from Singapore, through Durian strait. (*See* directions, p. 567)

Cap island, in the Southern approach to Phillip channel, 3¾ miles southward of Round island, is a rock about 40 feet in height, with a flat top and perpendicular sides; it is surrounded by a reef to the distance of about 1½ cables, with depths of 4 to 5 fathoms at 3 cables off the island.

See charts, Nos. 2,403 and 2,404.

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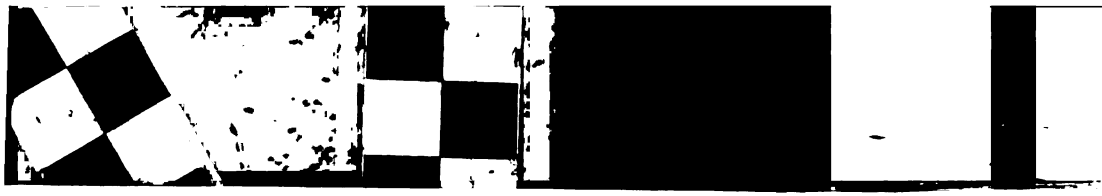

l-channel reef, situated nearly midway between Cap island eep cape, is about three-quarters of a mile in length north and 1½ cables in breadth, with a depth of 12 fathoms between it ap island, and from 6 to 13 fathoms between it and Steep

ə Coast.—That part of the southern side of Singapore strait en Phillip channel, and the Sambu islands situated a distance iiles to the north-eastward, is formed of numerous islands lying ch side of the entrance of Salat Batu Haji, which separates lands of the Bulang archipelago from pulo Batam.

north-west coast of Batam comprises the islands and coast ding from the entrance of Salat Batu Haji, in a north-east ion to Tanjong Pingi, a distance of 3 miles.

lang archipelago.—Islands and dangers. (*See* also .)—The following islands and dangers border the Main strait :—

nymede, the largest and westernmost island, about one mile gth and half a mile in breadth, is composed of a number of rately elevated hills. Several rocks above water lie on the reef encircles the island.

tle Ganymedes are two small islands half a mile westward nymede, and connected with it by a reef which further extends es westward of them.

len Mar reef, awash at low water, and steep-to, is the outer- of the reefs which lie off the north-west end of Bulang. It ith Raffles lighthouse seen just within the left extreme of tor island bearing N.W., and distant $2\frac{8}{10}$ miles.

south peak of Great Karímon in line with Red islet leads half a mile northward of Helen Mar reef; and Steep cape g S. ½ W., leads half a mile westward of it.

o coral ledges, dry at low water and steep-to, lie midway en Ganymede island and Helen Mar reef.

ffalo rock, or Token, 5 feet high, lying well out towards irway of the strait, is about 30 feet in length, with depths of

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Barren islet, the outermost islet on the western side of the entrance to Salat Batu Haji, is a mere rock, and lies S.E. ¾ E. distant 1¼ miles from Buffalo rock, and within the 10 fathoms line of soundings.

Islets, reefs.—Within and southward of Barren islet, are pulo Nérup, High island, Saddle island, and many others, for which *see* the charts.

Salat Batu Haji, or Strait of the Pilgrim rock, separates the Bulang archipelago from pulo Batam. This strait is said to afford a safe and short passage into Rhio and Berhala straits, but it has not been properly surveyed, and, from the intricate nature of its navigation, it seems improbable that it will ever come into general use.

The safest approach to it appears to be that between the Sambu islands and pulo Blakang Padang, taking care to keep over towards pulo Mariám, to avoid the coral spit which projects about half a mile eastward of Blakang Padang; or, from Batam bay, after passing pulo Mariám at a short distance, bring it to bear N. by E., astern, passing about midway through the channel separating the groups of islands southward of Blakang Padang, from the Batam coast and the islands fronting it. (*See* also p. 563.)

Pulo Blakang Padang, the largest of the islands fronting the entrance to Salat Batu Haji, is about 1½ miles in diameter; it lies south-westward of Sambu islands, and is separated from them by a channel half a mile in breadth, in which the depths are from 8 to 15 fathoms. This island is encircled by a reef, which projects nearly half a mile in places.

Pulo Tolup and pulo Senáng lie about half a mile off the west coast of pulo Blakang Padang, encircled by the same reef.

Three small patches, awash at low water, with a depth of 7 fathoms close-to, lie about half a mile off the west side of pulo Tolup.

Pulo Mariám is an islet 2 cables south-eastward of pulo Sambu. In the fairway between Mariám and Tanjong Pingi are three patches dry at low water, and some foul ground.

Pulo Sambu, the larger of two islands which form the western limit of Batam bay, is separated from pulo Blakang Padang by a channel nearly half a mile wide having depths of 5 to 15 fathoms.

See charts, Nos. 2,403 and 2,404.

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· near the middle.

.tu Beranti is a rocky ledge, one-third of a mile in extent, the e of which is above water, and lies 6 cables N. by W. from Sambu. Another and similar ledge lies a third of a mile ward of it.

e depths near these dangers are irregular, and afford no reliable for a vessel approaching them; close to are depths of from 20 fathoms.

ddies and Overfalls.—Owing to the strong tidal streams h prevail in this part of the strait, and the rocky and uneven e of the bottom, violent eddies and overfalls are usually to be with, more especially towards the Sambu islands; it is therefore able to keep on the north side, near St. John's islands.

ORTH SHORE.—Between Tanjong Bulus and Tanjong Gul south-west extreme of Singapore island), a distance of 9 miles, he west entrance of the Old strait or Salat Tebrau, fronted by a ow bank which extends from Tanjong Bulus, and terminates prong half a mile to the southward of Tanjong Gul. (*See* 246.)

nchorage.—During the north-east monsoon good anchorage be obtained about three-quarters of a mile south of this bank in 9 to 10 fathoms water, with Tanjong Bulus bearing West nt 3 miles.

ULTAN SHOAL or Trumbu Karímon, situated on the h side of west entrance to New harbour, is circular, about two- ls of a cable in diameter, with rocks dry about 2 feet at low-water g tides. Close to the westward of the shoal are depths of 3 and

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LIGHT.—From a light-tower above a two-storied dwelling, erected on Sultan shoal, is exhibited at an elevation of 60 feet above high water, a *flashing white* light *every thirty seconds*, and visible in clear weather from a distance of 13 miles.

Ajax shoal, at one mile S.E. by E. ¼ E. from Sultan shoal is one cable in extent and composed of coral with sharp pinnacles, and has a depth of 3 fathoms. The water deepens gradually north-westward of the rock; but the south and west sides are steep-to.

A red buoy surmounted by a ball, marks the south-west side of the shoal.

SALAT SINKI, the deep water channel by which Singapore New harbour is approached from the westward, is bounded on either side by reefs, the edges of which are marked by red stone beacons on the starboard hand on entering and white on the port hand. The length of the channel, to Cyrene shoal, is 4 miles, and its breadth near that shoal, the eastern and narrowest part, is three-quarters of a mile, with irregular depths from 9 to 16 fathoms. Cyrene shoal is situated about 3 miles to the westward of New harbour.

The channel in New harbour, southward of pulo Brani, is known also as Salat Sinki (p. 215).

Pulo Sablu, a small islet 36 feet high, lies on the east side of entrance to Salat Sinki. A coral reef extends nearly half a mile eastward of it, but the channel side is nearly steep-to.

Beacons.—Three of the red stone beacons which mark the south side of Salat Sinki, are situated on the northern edge of the large reef that surrounds pulo Bosing. The fourth or easternmost beacon stands on the northern edge of the reef that surrounds Freshwater island or pulo Bukum.

A white stone beacon marks the reef, at half a mile southward of pulo Sekra Laut, and two white stone beacons the southern edge of Cyrene reef, north side of the channel. All these beacons have basket tops.

North side.—Pulo Sekra Laut, half a mile in extent, has a small island close to the eastward of it. These two islands are the southernmost of an extensive group of islands lying close together, to the northward of which is a navigable channel named Salat Sembulan. Pulo Ayer Chawan lies northward of pulo Sekra Laut.

A **reef** awash at low water, lies one mile westward of pulo Sekra Laut.

See charts, Nos. 2,403 and 2,404.

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stated.

rections.—Coming from the westward, and intending to ed through Salat Sinki into New harbour, a course may be steered s on either side of Sultan and Ajax shoals, but the track mended for vessels of heavy draught is southward of those rs; thence steer in mid-channel between the red beacons ng the reefs on the starboard hand and the white beacons on ort hand, to the entrance to New harbour. (*See* page 218 for rections for entering New harbour from the westward.)

the mail steam-vessels both to and from Europe, now pass gh Salat Sinki, great attention is paid to the beacons which it.

night, Raffles light, well in sight and bearing S.E. by E. or easterly, leads southward of Sultan (*see* Light) and Ajax shoals.

lat Sembulan is a navigable channel half a mile in breadth en the reefs fringing the south shore of Singapore island, and Pisi and Ayer Limau.

white stone beacon, with basket, marks the reef 4 cables off and nearly one mile eastward of Tanjong Gul, north side of Sembulan; and a red stone beacon, with basket, marks the west end of the reef extending from pulo Pisi, on the south f Salat Sembulan. An isolated patch lies off the beacon.

LANDS AND DANGERS.—A group of islands, about es in extent, lies to the southward of Salat Sinki, and to the ard of St. John and Blakang Mati islands, from which the is separated by a navigable channel nearly 3 miles in breadth. slands are separated by deep channels, which, however, are so nbered with reefs as to render them unavailable for anything nall craft.

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Beacons.—A sunken rock lies 3 cables north-eastward of the centre of Freshwater island, marked by beacons with staff and cage on its north-west and south-east extremes. A coral reef half a cable in length, with a least depth of 2 feet, and steep-to, situated 2 cables N.E. by N. of the south-east extreme of Freshwater island is similarly marked.

The beacons have been erected by the Oil Company owning tanks on the island, with the object of facilitating the access of the tank steamers to the Company's wharf.

Pulo Sudong, nearly 1¼ miles eastward of pulo Sablu, stands on the eastern part of a coral reef, the western edge of which is one mile distant from it.

Alligator island (pulo Rengkam), about one mile in extent, and 142 feet high, lies about half a mile southward of pulo Sudong; the space between the reefs encompassing it and Barn island afford no safe passage for vessels.

Bank.—Westward of Alligator island is a bank about 4 miles in length within the depth of 10 fathoms, in a north-west and south-east direction, with a patch of 5½ fathoms, the least known depth, at about one mile south-west of Alligator island.

Barn island (pulo Senáng), half a mile south-east of Alligator island, is about one mile in extent, 103 feet high, of a level aspect, and covered with trees. It is fringed with a reef, which extends a quarter of a mile from its east side, but barely 2 cables from its south and west sides, near which are depths of 9 to 10 fathoms.

The Rabbit and Coney are two small islets, nearly connected with the south-east end of Barn island by a reef of rocks partly dry at low water. A rocky spit, covered at high water, projects one cable southward from the Coney, the southernmost islet.

The depths southward of Coney island, though irregular, are deep, there being 20 fathoms a short distance off the spit.

RAFFLES LIGHT.—From the white lighthouse, 91 feet high, on Coney islet, is exhibited at an elevation of 105 feet above high water, a *fixed white* light visible from a distance of 13 miles in clear weather, between the bearings of S.E. by E. through north and

See **charts, Nos. 2,403 and 2,404.**

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Rock.—Clearing mark.—A small ledge of rock barely dry at ng tides, and steep-to, lies S.E. by E. distant 6 cables from the h-east point of Middle island.

ulo Jong (a small round islet 72 feet high, lying half a mile h-west of Middle island) open eastward of Middle island, leads h-east of the rock, and the high peak of Great Karimon in line n or seen over the north part of Barn island leads southward of danger.

he Sisters are small islets about 6 cables westward of West John island; the South Sister, named pulo Subur Besar, is eet high. Subur Kechil is 78 feet high. They are surrounded reefs to the distance of one cable, and close to their edges are gular depths of 5 to 9 fathoms. The channel between them and st St. John is free from danger, with depths of 14 to 24 fathoms. early half a mile W.S.W. of the Sisters is a bank of 3 fathoms, a short distance westward of this bank is another of 5 fathoms.

rumbu Selegi.—A red stone beacon surmounted by a basket, ds on the eastern side of Trumbu Selegi, situated about 7 cables h-west of the Sisters.

t. John's islands (pulo Sakijang), with Peak island, form south-western limit of Singapore road.

Vest and East St. John are each about three-quarters of a mile

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Peak island, or pulo Tambákul, about 2 cables eastward of East St. John, is 92 feet high, and encompassed by a reef which extends about three-quarters of a cable in a southerly and south-easterly, and 2 cables in a north-westerly direction. A white stone obelisk on the south-east side of Peak island, marks the southern limit of Singapore road.

Between these islands are narrow channels about half a cable wide, with depths of 6 to 16 fathoms.

Pulo Sekuker.—In the space between St. John's islands and Blakang Mati, are a few small islands, pulo Renget and pulo Sekuker, 81 feet high, being the principal, and several reefs.

The channels between them are too intricate for ordinary navigation, except that northward of pulo Sekuker, which is occasionally used by coasting craft; the tide swirls and eddies are very strong near the 17 feet patch in the fairway northward of Sekuker.

Clearing marks.—To avoid all the dangers between St. John's islands and Malay point, Peak island must not be brought to the eastward of S. ½ E., whilst mount Serapong bears northward of W.N.W. When mount Serapong is to the westward of that bearing, a vessel may stand on until the western extreme of West St. John's island bears S. by W. ½ W.

BLAKANG MATI ISLAND* lies to the southward of the southern part of Singapore island, from which it is separated by New harbour. The island is 2 miles in length in an east-south-east and west-north-west direction, and its western end terminates in a point, but its eastern extreme is one mile in breadth.

The island is fortified. Barracks are built on the hill close westward of mount Serapong, and a military road runs the whole length of the island.

Reefs.—The island is fringed by a reef, which from Berhála point, its north-eastern extreme, projects a quarter of a mile; this part of the reef is known as Berhála spit, and from its outer extreme Berhála point bears W. ¾ S.; thence it trends for the eastern extreme of the island, from which it projects but a short distance. Off the south point of the island the reef fronting it extends about 1½ cables,

* *See* plan, No. 2,028.

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) about the same distance along its west side; but a small ied reef named Peláwan, about 1½ cables in extent, lies 2 cables the west side of the island, at three-quarters of a mile from its west point.

unts Serapong and Imbiah.—Serapong, 290 feet in height, ied with trees, and situated near the north-eastern extreme of ng Mati, is conspicuous when approaching Singapore road from astward, and will assist a stranger in making out the land, hn's islands being seen to the southward of it. There are several hills of less height than Serapong upon Blakang Mati, but they ore observable in coming from the westward, when they will en under the higher land of Singapore island.

er Tanjong Rimau, the west extreme of the island, is mount o, 153 feet high, surmounted with a clump of fir trees, the tops hich are 226 feet high. Eastward of Siloso, and south from aun rock, is mount Imbiah, 204 feet high, and other hills to the ard, all of which are covered with small trees and scrub. t Imbiah has on its summit a trigonometrical station, marked pole imbedded in a stone.

DAL STREAMS.—It is high water, full and change, at s lighthouse, at 11h., but the stream does not set to the east- till two hours later, and it is then about half ebb by the shore.

e tidal streams from Malacca strait and from the China sea between Tree island and Tanjong Bulus, but no dependence be placed upon them; they sometimes run strong towards n strait, and at other times northward towards the Old strait ngapore. For streams farther to the westward, *see* p. 192, and to astward, p. 239.

o from Tree island to Raffles lighthouse the streams cannot be nded on to set as fairly through the channel as they do to the ard of the lighthouse, but may be expected to draw more s the channel in a north-easterly and opposite direction. The ns set fairly through the channel about E.N.E. and W.S.W. een Raffles lighthouse and St. John's islands, frequently very g, with eddies on the springs. Their greatest velocity is from ½ miles per hour.

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tidal stream has been observed in both monsoons to run to the

and the same length of time to the eastward. During the strength of the north-east monsoon, at neap tides, the stream sets to the westward at times for three or four days, although there is a regular rise and fall by the shore. (*See* streams in New harbour, p. 217.)

TEMPORARY ANCHORAGES for sailing vessels.—Owing to the strong tidal streams in the western part of Singapore strait sailing vessels are frequently obliged to anchor, for which purpose the north side of the channel is to be preferred. Between Sultan shoal and Raffles lighthouse on that side there is convenient anchorage in 6 to 12 fathoms, while to the southward the water is deep, and the bottom rocky; the south side of this part of the strait is, therefore, unsuitable for anchorage, especially as violent squalls are of common occurrence. The most convenient anchorages between Raffles lighthouse and St. John's islands are the banks which front the Sisters and Middle islands.

Abreast of the south end of St. John's islands, vessels ought not to anchor if it can be avoided, for the water is deep, and the tidal streams and eddies run with greater strength than in any other part of the strait.

There is fair anchorage between Buffalo rock and Helen Mar reef, as well as about one mile or so to the northward and westward of the latter danger; also from one to 2 miles eastward of Buffalo rock, in 12 to 19 fathoms, or between it and Barren island. Vessels may stand closer inshore and anchor in depths under 10 fathoms, southward of a line N.E. by E. ½ E. and S.W. by W. ½ W. of Barren island; it is however unadvisable to go too close in, on account of the strong tidal streams, sometimes rendering it difficult to get under way again, especially in the light winds which prevail here.

Vessels at anchor, or coming to an anchor during the night, should be careful to ascertain their position as nearly as possible, and to have a good bearing off Raffles light; they should also keep a vigilant look-out that they do not drag their anchors and drift into danger.

DIRECTIONS.—To proceed eastward through the western part of Singapore strait, from a mid-channel position between Little Karímon and Tanjong Bulus, where there are depths of from 17 to 22 fathoms, steer between East and E.S.E. as the prevailing tidal stream may require.

See charts, Nos. 2,403 and 2,404.

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el course between Tree island and Sultan shoal light ; at night, light should be kept bearing southward of East, if on the side of the channel, to avoid Tree island reef ; and eastward . by E. if on the north side. Having passed Tree island steer nd Raffles lighthouse from a half to one mile distant ; or if the and tide be adverse, or from other circumstances it be desirable so, anchor to the westward of Barn island, out of the strength stream. Having rounded the lighthouse, steer to pass St. John's s about half a mile distant, keeping Raffles lighthouse bearing ard of S.W. by W. ¾ W., to avoid the rock south-eastward of e island. At night, keep Raffles light in sight bearing by W. ¾ W. or more westerly. After rounding East St. John, and to Singapore road, proceed as directed at p. 226; and if through the eastern part of the strait, shape course E.N.E. s northward of Horsburgh light, and proceed as directed at .

working through between St. John's islands and Raffles ouse, it is usual to keep on the north side of the channel, g short tacks if necessary, as that part of the strait affords bly convenient anchorage along the greater portion of it, and s are liable to meet with light baffling airs which would render essary to anchor. It is especially requisite to attend to this eastward of Buffalo rock, for on that part of the south side of rait the water is deep, and the bottom rocky and unsafe for ring, the danger being much increased by rapid tidal streams ddies and overfalls.

danger on the north side of this part of the channel will be d if the south extreme of St. John's islands be kept northward . by E. ½ E., or Raffles lighthouse westward of S.W. by W. ¾ W., ese bearings more particularly apply to the rock which lies y E. from Middle island. While to the westward of the rock, s may stand to the northward until the south end of St. John E.N.E. ; and eastward of the rock, between Middle island and

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When approaching Buffalo rock from the westward, until Middle island bears N. by W. $\frac{3}{4}$ W., the vessel will be westward of the rock, and in daylight may stand to the southward, if necessary, until Red islet bears W. $\frac{3}{4}$ S., which leads northward of Helen Mar reef, but it is better to keep over towards the lighthouse. When Middle island bears N. by W. $\frac{1}{2}$ W. keep Raffles lighthouse to the southward of W. $\frac{1}{4}$ S., until eastward of Buffalo rock.

For proceeding westward, reverse the above directions.

Caution.—In hazy weather during the night, great care must be taken in steering between Raffles lighthouse and Tanjong Bulus, for no dependence can be placed upon the set of the tidal streams, for they sometimes run strong towards the strait of Durian, at other times to the northward towards the Old strait of Singapore.

SINGAPORE NEW HARBOUR.*

General remarks.—The depths in Singapore New harbour and in both entrances are sufficient for all classes of vessels, and there are depths of 18 to 40 feet alongside the wharves at low water.

New harbour, the name given to the channel between Singapore and Blakang Mati islands, is about $2\frac{3}{4}$ miles in length, in an east and west direction, but the main channel takes a somewhat serpentine course; the breadth of the harbour in several places is not more than $1\frac{1}{2}$ cables.

Entrances.—The western entrance is a little more than one cable wide, and lies between Tanjong Rimau and Tanjong Blayer. The eastern entrance lies between Tanjong Pagar and Buran Durat reef.

As an anchorage, New harbour is indifferent, but the harbour authorities do not now permit vessels to anchor except under special circumstances (*see* p. 219).

New harbour has grown into a place of considerable importance; it possesses extensive dock and wharf accommodation of the highest possible value, situated as it is in the very centre of Eastern commerce. The Tanjong Pagar Company, the Peninsular and Oriental Company, together with other steam proprietors and merchants, have erected extensive coal stores, capacious docks wharves, and jetties, the latter allowing of the largest steam

* *See* plan of Singapore New harbour, No. 2,023.

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vessels being lashed alongside in perfect security. It is the place of arrival and departure of the mail steamers; and all other steam vessels proceed here to coal.

The whole of the above establishments are situated on the north or Singapore side of New harbour.

Both sides of the harbour are fringed with reefs which dry at low water, but close to their edges there are usually depths of 3 to 4 fathoms, increasing suddenly to 5 and 6 fathoms, and to this circumstance New harbour owes its importance.

Submarine mine fields.—Practice with submarine mines takes place near both the western and eastern entrances of Singapore:—Vessels are prohibited from either navigating in, or anchoring over, the area set apart for the above mine fields, as obstructions may be met with.

The limits of the mine field westward of Tanjong Rimau, western entrance to Singapore, are marked as follows:—On the north-west by a line from Tanjong Rimau, extending 5 cables south-westward, there marked by a spherical red buoy, thence by a line drawn to a similar buoy placed one mile south of that point, and thence by a line extending in a north-east direction to Blakang Mati.

The mine field near the eastern entrance to Singapore, in Sinki strait, is a rectangular area extending about one cable eastward of the black beacon on Buran Duran reef, and above 1½ cables northward of the reef.

The depôt is on the west end of pulo Brani (p. 214).

Supplies.—Every description of supplies are to be obtained. Powerful tugs are available when required.

Docks.—For details of docks, *see* p. 4.

Repairs.—The large sheers on the Tanjong Pagar Company's sheer wharf, which has a low water depth alongside of 28 feet, will lift 35 tons; and the steam sheers of the New Harbour Dock Company, which has a depth under them of 23 feet, will lift 45 tons. Repairs to hulls, engines, and boilers of vessels of the largest class can be effected by the dock companies; spare shafts are kept in stock, in sizes varying

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120 inches. The barracks at the docks accommodate crews 500 and 250 men. Repairs to native craft are effected at Tanj Rú, *see* page 224.

Pilots for Singapore are usually to be found near Sultan sh If none are there at daylight in their steam launches in the trac vessels off Sultan shoal, the signal station on mount Faber always repeat the signal for a pilot, and one will go out.

They will always be found at the Pilots' Club in New harbo *see* Directions, p. 218.

Coaling wharves.—Signals.—Most of the large steam ves make use of the extensive wharf accommodation belonging to Tanjong Pagar Dock Company, alongside which there is fr 25 to 40 feet at low water. Her Majesty's vessels are also coa there. About 200,000 tons are usually in stock at Singapore.

The Tanjong Pagar Company's wharves are easy to go alongs Vessels requiring coal should hoist the Commercial Code rendezv flag at the dip, when a similar flag will be waved from the wharf which the vessel can go alongside. A disc with the number of section cut out on it to which the vessel is to proceed is shown fr the yardarm of the Pilot Club's flagstaff. They are numbered fr 1 to 9, from the eastward. *See* also pp. 211, 212. 200 tons an hour be put on board, if urgently required ; 100 tons an hour can alw be depended on, due notice having been previously given.

NORTH SIDE OF NEW HARBOUR.—Tanjong Blay the north-western limit of New harbour, is formed of cliffs 47 feet height. From thence the cliffy coast line trends in a north-weste direction, backed by a ridge of densely wooded hills, the tops of trees being one to 5 feet above high water. It is fringed with a wh beach named Pasir Panjang, or Long beach, upon which, at ab 50 yards from Tanjong Blayer, stands a white obelisk denoting harbour limit in this direction. A reef, half a cable in width, fro the coast.

Between Tanjong Blayer and mount Chermin there is an imp sable mangrove swamp into which Blayer river empties itself, off mouth of which river a reef extends about one cable.

Pier.—At 130 yards north-eastward of Tanjong Blayer is a milita pier, with 13 feet water at its extreme.

See plan No. 2,023.

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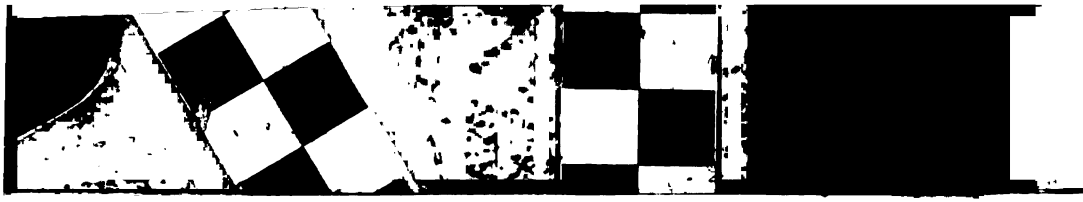

Lot's Wife is a rock about 6 feet above high water, lying immediately off the pitch of Tanjong Blayer inside the edge of the shore reef, which is here steep-to. A white beacon, with staff and ball, marks the south edge of the shore reef.

Blayer rock, with 7 feet water, lies W.S.W. rather more than half a cable from the Tanjong Blayer.

A patch having 3 fathoms water lies W. ¼ N. distant 2¾ cables from Tanjong Blayer, and is the shoalest part of a bank having depths of 3½ to 4½ fathoms, with 7 and 8 fathoms close to its outer edge; there is a depth of 6 fathoms between this bank and the reef fronting Pasir Panjang beach.

To clear the 3 fathoms patch, and also Blayer rock, keep Tanjong Tereh, a conspicuous red bluff on the north end of pulo Brani, well open southward of the Peninsular and Oriental Company's jetties.

Hantu, the small round island lying in front of Chermin bay, is nearly 1½ cables in diameter, 133 feet high, and covered with trees. A reef surrounds the east, south, and west sides of the island, the edge of which, on the south side, is marked by a white beacon with staff and ball. The north-east side, opposite the dry dock, is nearly free from reef, with depths of 3 fathoms at 50 yards from the island.

Chermin bay, eastward of Bukit Chermin and northward of Hantu island, has depths of 4½ to 6 fathoms.

The New Harbour Dock Co.'s docks, p. 4, and wharves are situated on the east side of Chermin bay. The wharves are about 400 yards in length. Westward of the sheers, the depth alongside the wharves at low water springs is from 16 to 18 feet, and eastward of the sheers from 23 to 24 feet.

Eastern Extension Telegraph Co.'s wharves, westward of the New Harbour Co.'s docks, are situated at the head of Chermin bay. They are 750 yards in length, with a least depth of 18 feet alongside at the eastern end and 26 feet at the western end; they are somewhat more difficult for a large vessel to get alongside than the other wharves.

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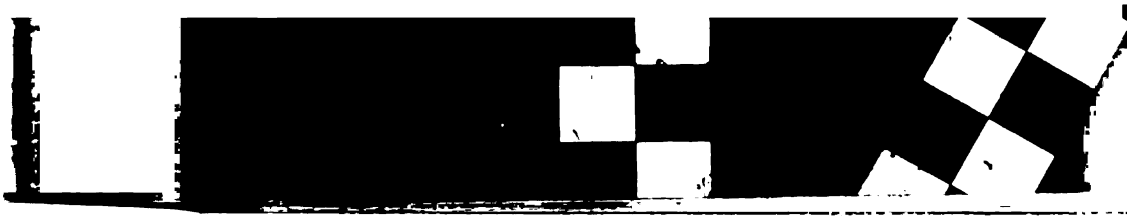
P. and O. wharves.—About one-third of a mile eastward of



Co.'s wharves, which have extensive coal stores and wareh behind them. These buildings are on ground that was once a island, but now connected to Singapore by a road and tramway

There are four wharves—the westernmost of the two largest has a depth of 25 feet alongside at low water, and the eastern 22 to 25 feet. The smaller one has from 15 to 16 feet. A 30 yards off the eastern wharves is a rocky patch with 19 feet and 25 feet between it and the wharves.

Keppel rock, with 4 fathoms water, lies W.S.W., three-qu of a cable from the western extreme of the Peninsular and Or Company's wharf. Close around the rock are depths of 4 6 fathoms. The south extreme of St. James' hill in line wit eastern extreme of the Peninsular and Oriental Company's j leads southward of the rock.

Telok Sibet, eastward of the Peninsular and Oriental wh dries near low water ; on the opposite side of this bay, at one cable to the eastward, is St. James' hill, 50 feet high, hav house partly hidden by the trees on its summit, and is a bea feature in the delightful scenery of this harbour.

The submarine telegraph cable crosses the harbour from th side of St. James' hill to pulo Brani, near the torpedo establishi there is a notice board on either shore marking it, warning v not to anchor over it.

Patch.—At half a cable S.S.W. from the south-west extre St. James' hill is a patch of 2¼ fathoms, with deeper water be it and the shore reef.

Clearing mark.—The south extreme of the buildings at Ta Pagar in line with Tanjong Brani leads close to Keppel rock an above patch ; the buildings therefore should be shut in when n between those dangers.

Telok Blanga, on the east side of St. James' hill, is abou cable wide at its entrance and dry at low water.

Tanjong Pagar Dock Co.'s wharves.—From Telok Bl to Tanjong Pagar, a distance of over a mile, the shore is occupie the Tanjong Pagar Co.'s wharves, docks, and coal stores, the and factories being situated near the eastern end.

See plan, No. 2,023.

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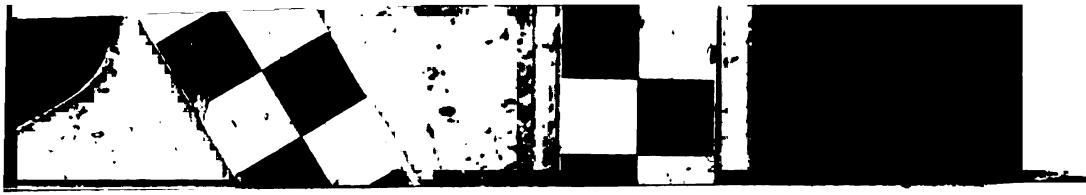

This stretch of wharves is divided into sections, No. 1 being the easternmost, extending as far as the docks, and No. 9 the westernmost.

The western wharf (Jardine's) is 300 feet in length, with a depth of 18 feet at low water at its eastern half and 25 feet at the western.

The Brani ferry boats start from near the western corner of this wharf.

The western Borneo wharf is 440 feet in length, with a least depth of 18 feet alongside near its centre and 22 to 30 feet in other parts.

Eastward of this wharf the depths alongside range from 22 to 30 and 40 feet at low water.

The deepest water, and the berths usually assigned to vessels of heavy draught, extends over a length of about 1,000 feet, between the buildings numbered 25 to 20 on the plan.

New pier.—Light.—From the end of Tanjong Pagar sea wall, a pier is being constructed in an E.S.E. direction to increase the wharf accommodation, for about 400 yards, on the southern edge of the shallow water, extending southward from Malay spit. Its eastern extreme is marked by a *fixed red* light. A large portion of the bight northward of it is being reclaimed.

Pilot's club is situated close to the east side of entrance to the Albert dock, and is distinguished by a flagstaff with signal yard, upon which the signal is hoisted to indicate the section to which a vessel is to proceed alongside. Pilots are always to be found here. (*See* also p. 209.)

Observation spots—For the convenience of shipmasters the Tanjong Pagar Co. has placed three large flat stones for astronomical observations. One of these is placed near the Pilot's club, entrance to Albert dock, and is in lat. 1° 15′ 59″ N., long. 103° 50′ 24″ E. The other two are at the east and west ends of the Borneo wharf, respectively in lat. 1° 16′ 8″ N., long. 103° 49′ 43″ E., and lat. 1° 16′ 1″ N., long. 103° 49′ 32″ E. (*See* also p. 222, and Time signals p. 221.)

Mount Faber is the name of a conspicuous range of hills which rise boldly near the middle of the northern shore of New harbour.

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Signal staff.—Near the middle of the range is a flagstaff, w like that upon fort Canning hill, is crossed by two yards, use signalling the arrival of vessels from the westward, and repe the signals made from fort Canning. The height of the range w the flagstaff stands is 295 feet, nearly the same height as m Serapong on the opposite side of New harbour.

Guthrie hill, 100 feet high, is isolated and conspicuous, situated about a quarter of a mile northward of the Tanjong docks.

SOUTH SIDE OF NEW HARBOUR.—Tanjong Rir the north-west extreme of Blakang Mati island (p. 203) and the s west limit of New harbour, is formed of cliffs with patch shelving rock projecting from their bases. The shore reef ex one-third of a cable in a westerly direction from the point, with 9 to 16 feet water close-to, and from 3 to 4 fathoms beyond.

Pier.—Nearly 2 cables eastward of Tanjong Rimau is a mi pier with about 10 feet at low water at its extreme; a road thence to mount Serapong and the barracks.

Berdaun rock is a small patch of coral covered with man trees, distant about half a mile east from Tanjong Rimau, and h cable from the Blakang Mati shore. A reef, dry at low w extends about two-thirds of a cable westward, and about a third cable northward and eastward from the rock, with shallow wa short distance beyond it.

Selegi island lies near the western entrance of Sinki strait, 1½ cables to the eastward of Berdaun rock, and fronts a bight at low water, named Imbeah bay. It is a remarkable little is 86 feet high, wooded and almost circular in shape. It has a pier on its north-east side.

Mæander shoal, about one cable in extent, east and west, 1½ fathoms least water, lies on the south side of the fairw New harbour, 1¼ cables southward of the Peninsular and Or Company's wharves. The northern edge of the shoal is mark two red buoys.

PULO BRANI, on the south side of New harbour, is r two-thirds of a mile in length, east and west, with an ex

See plan, No. 2,023.

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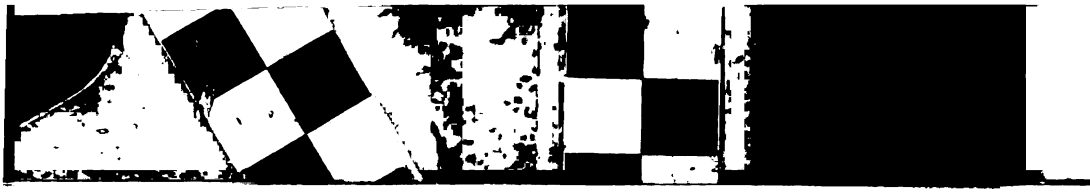

breadth of 4 cables. On its north-eastern side are three hills, the middle one, which is the highest, being 157 feet above the sea and covered with low trees. The northern hill has barracks on it.

Tanjong Tereh, the north extreme of the island, and Tanjong Teregeh, the south-east extreme, are both formed by cliffs; those forming the northern point are of a red colour, and present a bold red bluff, which is conspicuous when viewed from either entrance of the harbour.

This island, like Blakang Mati, is encircled by a coral reef with occasional patches of sand, which uncover at about two-thirds ebb. From Tanjong Risim, the west end of the island, the reef extends $1\frac{3}{4}$ cables and forms a spit, having a white stone beacon with ball on its outer edge. The eastern side of the island is fronted by Brani reef, which extends off Tanjong Teregeh nearly a quarter of a mile; this extreme is known as Teregeh spit and is marked by a white stone beacon with ball; shallow water extends nearly one cable beyond it. *See* Buoys, p. 216. A similar beacon marks the extreme south of the point.

Submarine mine depôt.—Just to the north-eastward of Tanjong Risim, are the torpedo stores, with a convenient pier extending a little beyond low water. The Royal Engineer officers' quarters and barracks are close-to. *See* submarine mine-fields, p. 208.

Saga bay lies between Tanjong Risim and Tanjong Tereh, and is dry at low water.

Some years ago a dry dock was begun here (now in ruins), but its completion was stopped by the Government, who has since built a jetty and storehouses close to the dock. There is a depth of 18 feet alongside the jetty, but the strength of the ebb stream near it renders the jetty an undesirable place for other than small craft.

Tin works.—On the south side of pulo Brani are tin smelting works, with a wharf 150 feet in length, having from 18 to 20 feet alongside. The Bon Accord dock (in ruins) is situated on these works.

Engineering works.—Eastward of the tin works are the Government Engineering Works, which are capable of undertaking

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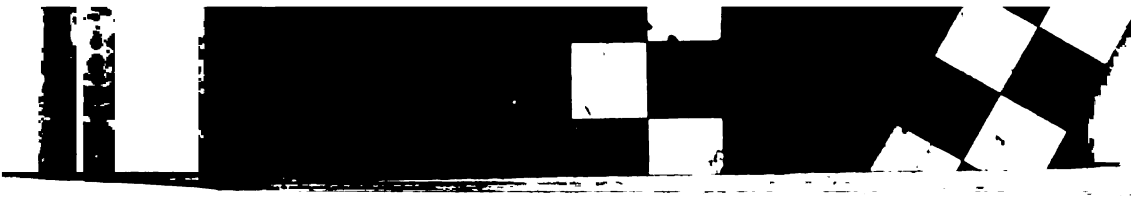

SALAT SINKI is the channel between pulo Brani and Bla Mati, with a least depth at low water of 3¼ fathoms in the fair

(The western approach to New harbour is known also as Sinki.)

Owing to the uncertainty of the direction of the gusts of caused by the adjacent high land, it is scarcely considered saf sailing vessels.

The strait is partially barred about midway by a narrow bank 2 fathoms at low water near its centre, extending more than way across from the military pier on the south shore. There patch of 2¾ fathoms in the fairway westward of it, and a deta reef, dry at low water, lies about three-quarters of a cable off Brani, westward of the tin works.

A submarine mine-field is set apart on the south side of eastern entrance, mentioned on p. 208.

Beacons.—To render Salat Sinki navigable for vessels of mod draught, beacons have been placed on the edges of the reefs.

On the north side, in addition to the white beacons on Tan Teregeh and on Teregeh and Risim spits, previously mentioned white beacons have been placed on the southern edge of the deta reef westward of the tin works. The eastern has a white ball the western one a white iron disc. (At half a cable E. by S. of the eastern beacon is a patch of 7 feet.)

On the south side of the strait, red beacons mark the end o reef extending north of Tanjong Berhala, the edge of the reef b conduit westward of the military pier, and the edge of the reef ward of the pier swimming bath. A red buoy also marks the e the spit off the military pier.

The tidal streams in Salat Sinki run with considerable stre the flood to the westward and the ebb to the eastward, with no water; there are swirls and eddies at the eastern entrance an the spit extending from the military pier. *See* tides, pp. 216, 21

EASTERN ENTRANCE TO NEW HARBOU Depths.—The eastern entrance is divided into three channe shallow banks. The northernmost affords the best water, the depth being about 6 fathoms at low water, between Tembaga

See plan, No. 2,023.

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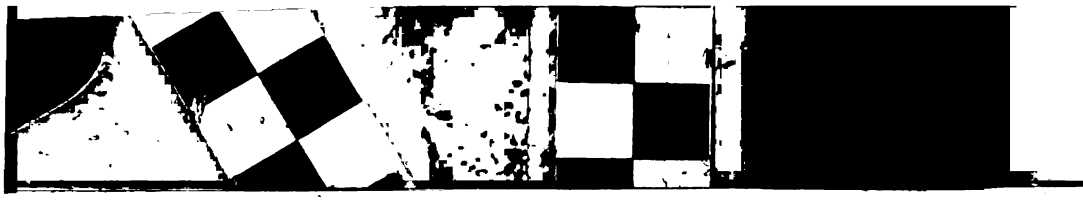

and the wharves. Middle channel has not less than 4 fathoms on a straight course, and South channel about 3¼ fathoms. Directions, *see* p. 219.

Brani shoals lie at the eastern entrance of New harbour, between Tanjong Pagar and pulo Brani, and within a depth of 3 fathoms, extend about 4 cables in the direction of the channel. The least water upon these shoals is 11 feet.

Buoys.—Too much dependence must not be placed on the buoys maintaining their charted positions, but the harbour authorities remoor them from time to time. Brani shoals are marked by four white buoys with balls, in from 2½ to 3 fathoms water, one being placed at each end and one on either side; the shoalest water lies almost midway between the two latter. A patch of 3 fathoms lies half a cable E. by S. ½ S. from the south-east buoy. Brani reef, extending from pulo Brani, on west side of South channel, is marked by two black buoys with balls; the southernmost lies N.E. ½ N., 1¼ cables from Teregeh spit beacon, and the northernmost one-third of a cable off the reef abreast Brani bay.

The depths decrease gradually towards the shoals except along the south-western edge; but elsewhere the lead, if properly attended to, will show when a vessel is nearing them.

Tembága rocks, dry in patches at low water springs, and lie between Pagar docks and Brani shoals; they are about half a cable in length in a north-west and south-west direction, and from 20 to 30 yards in breadth. Two red beacons with balls mark these rocks, one on either extreme. A white mooring buoy marks the edge of the 3-fathoms line eastward of the rocks.

Tembága shoal, about half a cable in extent, and with a depth of 9 feet, lies three-quarters of a cable north-westward of Tembága rocks; its north-eastern end is marked by a red buoy with ball.

Tides.—It is high water, full and change, at the Tanjong Pagar Dock Company's offices, at 10h. 35m.; ordinary springs rise 8 feet, neaps 5 feet, above the datum of the plan and of the published tide tables for Singapore, but the water frequently falls as much as 1½ and even 2 feet below this datum. The low water is affected by a large diurnal inequality amounting to several feet.

The highest high water is that following the superior transit of the moon when it has north declination, and the inferior transit

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when the moon has south declination. The inequality in the h
of the tide after two successive transits disappears when the
has no declination.

Tidal streams.—In New harbour the streams run str
between the western entrance points and off the north end of
Brani.

The ordinary rate of the tidal stream at springs is 2¼ knots, the
setting to the westward and the ebb to the eastward, changing
high and low water by the shore, but this is not to be depende
it is much influenced by the prevailing monsoon, and often
4 knots at springs.

During the north-east monsoon, at the neap tides, alt
the water rises and falls, yet the stream sometimes
to the westward, for two, three, or four days consecutively ;
times it may be as many days quite still ; or a rush of wate
flow into or out of the harbour at the rate of 3 and 4
These fluctuations occur most frequently during the nort
monsoon, and depend chiefly on the force of the wind i
China sea, yet they sometimes happen in the south-west mo
without any apparent cause. *See* remarks on tides, p. 28.
tables for Singapore may be purchased.

At the Pagar Dock Co. wharf there is a self-registering tide

Eddies.—In Chermin bay, the streams sweep round Hantu
with considerable force, but close to the Telegraph Com
wharves at the head of that bay there is an eddy stream o
tides. There is also a slight eddy at each end of the P. and O
wharves.

Alongside the wharf at Saga bay, pulo Brani, it is quite
water on the flood, but the ebb runs strongly.

There is a strong eddy on the ebb, about 1½ cables eastward
projecting Borneo wharf.

The flood stream sweeps to the westward along the Tanjong
Co.'s wharves from the dry docks as far as the Borneo
with very little strength, but thence it runs strongly. On the
on the western side of Tanjong Pagar the projecting line of w
causes slack water on that side. Approaching Tanjong Pa

See plan, No. 2,023.

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unaware of this fact, the bow being in slack water with a strong current on the quarter, an awkward sheer might be experienced and should be guarded against.

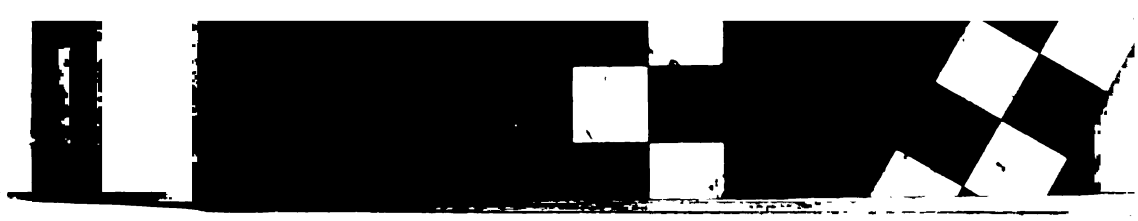
DIRECTIONS.*—Although there is no great difficulty in piloting vessels into or through New harbour, or alongside any of the wharves, strangers are recommended to employ pilots until sufficiently acquainted with the local peculiarities, which may possibly cause difficulties in such a place where the space is limited and the tidal streams are strong and uncertain.

Western entrance.—Vessels proceeding into New harbour through the western entrance, which is little more than one cable across, should keep in mid-channel, observing that the southern extreme of the buildings on Tanjong Pagar kept in line with Tanjong Tereh, bearing N. 83° E., will lead southward of the 3-fathoms patch outside the harbour, also of Blayer rock, and of the reef extending off Hantu, on which there is a white beacon. Approaching Keppel rock, the east extreme of St. James' hill should be opened of the P. and O. eastern wharves (shutting the Tanjong Pagar southern building in) which leads southward of the rock.

From abreast Mæander shoal, keep in the fairway until it is known to which wharf the vessel is directed. *See* wharf signals, p. 209.

Approaching the western entrance of New harbour, from the south-eastward, the channel between the Sisters and Middle island is recommended. Between the 3 fathom shoal half a mile westward of the Sisters, and the sunken rock south-eastward of Middle island, the channel is nearly 1½ miles in breadth. Pulo Jong kept open eastward of Middle island leads eastward of the rock.

Trumbu Selegi, with beacon, nearly one mile north-westward of the Sisters, should be given a wide berth, thence to the entrance to New harbour there are no dangers beyond a quarter of a mile off shore, but the submarine mine-field, p. 208, should be avoided. The channel, eastward of the Sisters, between them and West St. John island, is a good channel, and half a mile wide, for which the chart is sufficient guide. In the fair channel the general depths vary from 10 to 17 fathoms. The tidal streams are very irregular in the passages [illegible] islands, running sometimes 4 miles an hour at springs.



Eastern entrance.—Vessels proceeding from Singapore into New harbour, should steer to the south-westward, not appro ing Malay point nearer than one mile, nor hauling to the ward until mount Faber flagstaff is in line with a conspic red-tiled white house with a clock tower, on the Borneo w bearing N. 72° W., which being steered for leads southward of M spit, and to the entrance to North and Middle channels. In roun Malay spit the fishing stakes furnish a ready guide to vessels, outer ends of the longest lines of stakes having 5 fathoms water them.

Middle channel.—The above leading line being continued l obliquely through Middle channel, crossing the northern ta Brani shoals in 4 fathoms. Better water will be obtained ther opening mount Faber, northward of the tower, as soon as the wes Tembága rock beacon bears N.E. by E. ½ E.

To proceed through North channel, which is the best vessels of heavy draught, having approached on the leading above given ; when at about 2 cables distance from Tembága r south-eastern beacon, steer midway between the beacons mar those rocks and Tanjong Pagar wharves, to the wharf appointe signal.

South channel.—Tanjong Selensing being steered for v bearing W. by N., will lead up to and between the black buoy Teregeh spit and the white buoy at south-east extreme of I shoals ; thence steer in the fairway past the Middle white buoy, between the two buoys at the northern end of the channel, v course may be altered for the wharf appointed.

ANCHORAGE.—The general depths in New harbour are f 6 to 8 fathoms, but the bottom is foul, rocky, and indifferent hol ground, and care is necessary to prevent fouling the anchors.

The harbour authorities, however, do not permit vessels to an in New harbour, except under special circumstances, as it obst the traffic.

Vessels waiting for a few hours preparatory to dropping along the wharf are occasionally anchored off the Royal Engineers' on pulo Brani, and this anchorage used to be considered the in New harbour. They are sometimes temporarily anchored so westward of Tanjong Tereh.

See plan, No. 2,023.

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The tidal streams run strong at both. Close westward of the north-west buoy of Brani shoal, the streams are slacker.

Proceeding alongside the wharves.—All vessels usually take a pilot; the tidal streams are so strong and variable and the space for manœuvring so limited that an intimate knowledge of the harbour is necessary. With a favourable strong stream it is sometimes necessary to go right through the harbour, and turn outside. (For details of wharves, *see* pp. 210–212.)

SINGAPORE TOWN AND ROAD.*

SINGAPORE.—The town of Singapore is built on each side of the Singapore river, a small stream, only navigable for boats. It is defended by batteries on Blakang Mati island, armed with heavy ordnance. A large military force is stationed here.

The commercial part of the town is on the south side of the river, the bank on that side being lined with quays and godowns for the landing and reception of merchandise. The river is usually crowded with cargo boats and many other descriptions of small craft on their way to and from the vessels in New harbour, presenting a scene of extraordinary bustle and activity. Singapore is a free port; there are no harbour or tonnage dues.

The post office and master-attendant's office occupy a portion of the site of Fullerton battery, on the south point of the river, and handsome blocks of buildings have been erected to the southward of the spot, upon some land which was reclaimed from the sea for that purpose. These buildings very much improve the sea front of the town, and are conspicuous as it is approached from the eastward.

Dalhousie obelisk stands a little northward of the north point of the river; close to the southward are two fine buildings, the one standing back is the courthouse, and that nearer the sea the town hall; the public offices lie southward of these, and close to the bridge across the mouth of the river.

On the north of Dalhousie obelisk, the esplanade extends along the sea front for the distance of a quarter of a mile, and the drive round it is the fashionable resort of the European residents in the cool of the evening. Behind the esplanade stands St. Andrew's church, one of the finest ecclesiastical structures in India, built after the model

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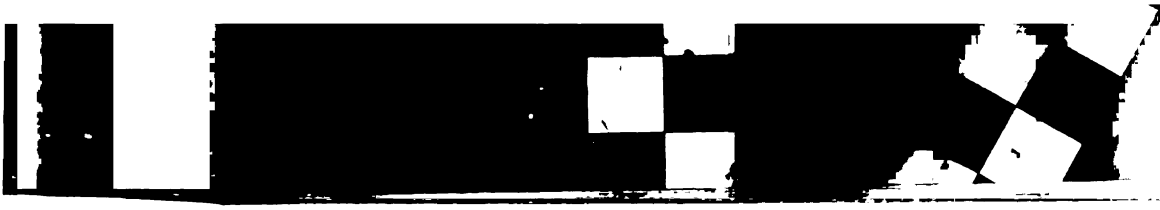

lofty spire, which is very conspicuous when viewed from seav To the right of the church is a very large building, named Raffles school ; extending from which in the same direction a number of handsome detached houses, standing in gardens. Bey this line of houses, is an extensive native town, the greater pa which is hidden by the sandy point named Tanjong Rú.

Johnston's pier situated about a cable southward of the entrance affords landing for boats at all times of tide ; a *red* is placed at each end of its cross head. A *green* light marks the of the pier on the east side of entrance to the river.

Boats can usually enter the river at low water.

Population, Trade and Shipping.—*See* pp. 2, 3 and 6.

Climate and Rainfall.—The island of Singapore is hot, but little variation of temperature, the thermometer usually ran from 73° to 90°. The monsoons are little felt on the island, but kept in a perpetual state of verdure by frequent showers. Ther no diseases or ailments due to climatic causes against which sp precautions are necessary. (For details *see* pp. 11 and 12.)

Hospitals.—The large hospital has 50 beds in the seamen's w and 10 in the officers'. The sailors' home accommodates 95.

Telegraph.—Mails.—*See* p. 3.

FORT CANNING.—Rising abruptly behind, and overloo the town of Singapore, is a hill 156 feet high, upon which forr stood a bungalow, the residence of the governor ; now, howeve crest of the hill is covered by a large fort, named Fort Canni honour of a former Viceroy of India.

Signal staff.—Near the middle of fort Canning, is a fla crossed with two yards, which is used during the day to signa arrival of vessels.

Time signals have been established on fort Canning, a pulo Brani in New harbour.

Each signal consists of a ball, hoisted as prepa at 0h. 55m. 0sec. P.M., and dropped daily (Sunday except 1h. 0m. 0sec. Singapore Observatory mean time (Transit instr at river entrance), equivalent to 18h. 4m. 34·95sec. Greenwich time.

See plan of Singapore road, No. 1,995.

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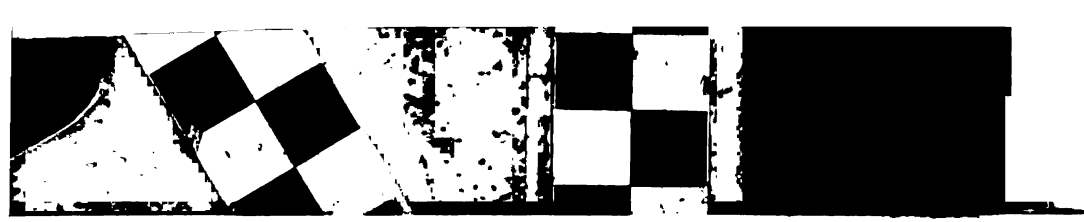

Should either signal fail, the ball that has not fallen will be dropped by hand at about 5 minutes past 1h., but this signal cannot be relied on for time. *See* Observation spots, p. 212, and below.

Observation spot.—A stone building for a transit instrument has been erected on the pier on south side of the river entrance, 267·3 feet N. 16° 22′ E. (true) from the old observation spot in Fullerton battery which has been demolished, and a drill hall built in its place. The position for the instrument is lat. 1° 17′ 14″ N., long. 103° 51′ 16″ E., deduced from the telegraphic determination made by Lieutenant-Commander Green, U.S.N. of the old observation spot in 1881-2.

LIGHTS.—A *fixed white* light is exhibited from the flagstaff in fort Canning, at an elevation of 256 feet above the level of the sea. It is visible through an arc of 68°, between the bearings N.N.W. ½ W. and W. ½ S., or from one mile eastward of Peak island to one mile southward of Johor shoal. In very clear weather it may possibly be seen from a distance of 22 miles.

Lights on landing piers, p. 221.

SINGAPORE ROAD* has depths of 6 to 10 fathoms, mud, at about 1½ miles off the town of Singapore, and is available for all classes of vessels. The limits of Singapore harbour, defined by the Colonial Government, 21st June 1877, are comprised within the lines joining the obelisk on Tanjong Katong and that on Peak island, the north-west extreme of Peak island and south extreme of Blakang Mati, the east and north coast of Blakang Mati, and the coast from the obelisk near Tanjong Blayer to the obelisk on Tanjong Katong.

Banks.—Outer shoal, lying on the south-east boundary of Singapore road, is 1½ miles in length in a north-east and south-west direction, and from one to 5 cables in breadth, having depths of 4 to 5 fathoms over the greater part of it, but some patches of 3¼ to 3½ fathoms lie near its south-west extreme.

The whole of fort Canning kept just open northward of Tanjong Katong obelisk, bearing N.W. by W. ¼ W., leads northward of Outer shoal; Peak island S.W. by S. will lead eastward of it; and the

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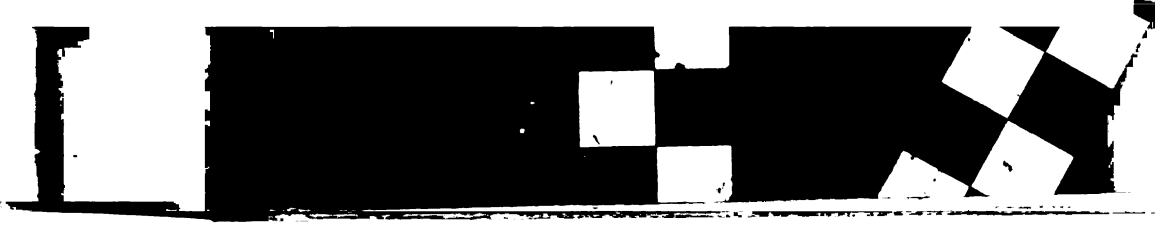

A patch, about 2 cables in extent, having 4 fathoms least w lies about a third of a mile south-westward of Outer shoal. M Serapong bearing W. ¾ N. leads between this patch and Outer s and bearing W. by N. ¾ N. leads southward of it.

Within Outer shoal are depths of from 10 to 12 fathoms, decreasing gradually to 7 or 6 fathoms, but shoaling suddenly fr depth of 5 to 3 fathoms; when fort Canning flagstaff bears t northward of N.W. by W. ½ W., caution is necessary in vesse heavy draught anxious to get as close in as possible. With Canning flagstaff to the westward of that bearing the d decrease more regularly. The outer extremity of the fishing s marks the 5-fathoms edge of the shore bank, eastward of I point (marked by red lights, p. 224).

Buran Darat is the name of an extensive coral reef w uncovers at about two-thirds ebb, and fronts the eastern coa Blakang Mati island, being separated from the shore reef by a na channel, with depths of 4 to 8 fathoms. The reef is about one m length in a north-east-by-north and south-east-by-south directi quarter of a mile in breadth at the northern end, and terminat a point at its southern extreme. There is a detached patch w depth of one fathom, with 3 fathoms close around, at about t quarters of a cable north-westward of the north edge of the re the centre of the submarine mine-field; Tanjong Teregeh be W. ½ S. leads northward both of this patch and of Berhála spit.

Beacons.—The north-eastern extreme of Buran Darat is m by a white beacon with staff and ball, and the north-western by a black iron cage on piles.

Malay spit, a mud and sand flat, with several patches of r and which dries at two-thirds ebb, fronts the coast between docks and Malay point, projecting in a south-easterly directi the distance of a quarter of a mile from the point. A consid portion is being reclaimed as before stated.

Depths of 2¼ to 3 fathoms, the extreme of a horn extending n eastward of Tanjong Pagar, exist at about 3 cables outside Mala with 4 to 6 fathoms between.

A red nun buoy with staff and ball marks the edge of the 3-fa line fronting Malay spit, about 1¾ cables E. by S. ½ S. of the n east corner of the reclamation.

See plan, No. 1,995.

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Malay or Malang point, composed of low red cliffs, the south-western limit of Singapore road, is nearly one mile southward of the entrance of Singapore river; Tanjong Pagar village lies on the west side of it, and immediately behind it is mount Palmer, 107 feet in height.

From a quarter of a mile northward of Malay point, the mud flats have been reclaimed, and a substantial sea-wall extends the whole way, and almost straight for Johnson's pier at Singapore.

Mount Wallich, a flat-topped hill 133 feet high, lies 2 cables northward of mount Palmer, and is conspicuous by its red cliffs. The main road to Singapore lies between them.

Fishing stakes.—Lights.—A line of fishing stakes lies eastward of Malay point, extending in a north-west and south-east direction for $4\frac{1}{2}$ cables, the inner end being $5\frac{1}{2}$ cables off shore. The outer end, in 5 fathoms, is marked at night by a *red* light about 6 feet above high water. A similar light marks the south end of the inner group of stakes; the channel between is half a cable broad.

Tanjong Rú is the extreme of the land extending $1\frac{1}{3}$ miles westward from Tanjong Katong, and forming the northern shore of Singapore road. It is separated from the western shore of the bay by a channel a quarter of a mile wide, with a depth of about 3 feet at low water spring tides. There is a police station on the point, and a house on piles about a cable westward of it.

Within Tanjong Rú is an extensive shallow lagoon, convenient for the anchorage of boats and native craft, and many are to be seen there at certain seasons.

Repairs.—A shipwright's yard is established at Tanjong Rú, and many small vessels go there to be repaired. There is also here a patent slip, belonging to the Tanjong Pagar Dock Co., with a length over all of 420 feet; breadth of entrance, 60 feet. (Mentioned also, p. 4.)

Tanjong Katong forms the north-eastern boundary of Singapore road. The obelisk, which marks the harbour limit in this direction, stands about one cable westward of the point. Farther westward is a small iron pier. The coast for some distance to the westward

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A detached bank, with depths of 2 to 3 fathoms, fronts Tan Katong, at about half a mile distant. Fishing stakes exist on i depths of 2 to 5 fathoms water.

This bank will be avoided by keeping mount Serapong bea westward of S.W. by W. ½ W. until the flagstaff on fort Can bears W. by N. ½ N.; or by not standing into a less depth 6 fathoms.

ANCHORAGE.—The trade of Singapore is so consider that a large number of vessels will always be found anchored in road within the harbour limits; small vessels may run in, gu by their soundings, and anchor where they can find a conve berth.

Vessels of heavy draught will find good, safe anchorage, in 7 to 10 fathoms water, with the flagstaff on fort Canning bet the bearings of W. by N. ½ N. and N.W. ½ N., and with the extreme of Blakang Mati S.W. ½ W.

Vessels of War.—The most convenient anchorage for vesse war and the nearest to the shore, is with the flagstaff on fort Can in line with the obelisk situated close south-west of the cr ground, and the left extreme of Blakang Mati island be S.W. ½ W.; or the obelisk on Tanjong Katong N.N.E. ¾ E. In position there is a depth of 10 fathoms, at about a third of a from the 3-fathom edge of the bank, and about 1½ miles fron landing place.

To indicate this anchorage, a conical, red buoy, with a staff plate, marked, man-of-war anchorage, is moored in 9 fat within the above position, with fort Canning flagstaff in with the obelisk. A space, one cable in width, the centr which is marked by the flagstaff and obelisk in line and exten from the shore to the buoy, is reserved for vessels of war o nations, exclusively. This buoy is occasionally dragged fro proper position, but is replaced by the Harbour authorities wi little delay as possible. During the sea breeze, a choppy sea up, especially on the ebb, rendering it dangerous for boats along

Foreign vessels of war are berthed after communicating witl Harbour authorities.

The quarantine anchorage is with the obelisk on Tan Katong bearing N.N.W., in not less than 11 fathoms water.

See plan, No. 1,995.

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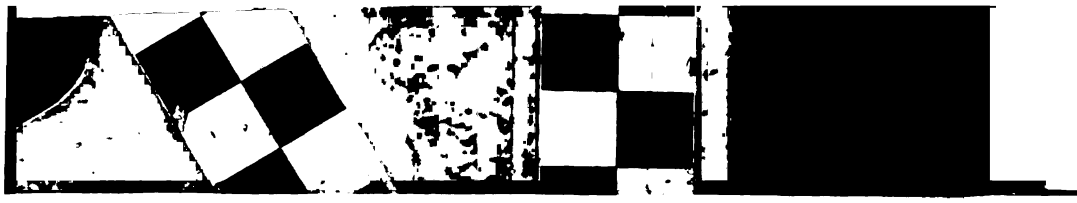

DIRECTIONS.—From the westward (*see* page 206).—When bound to Singapore road from the westward, and having rounded Peak island at the distance of about 2 cables, steer between N. by E. and N.N.E. in vessels of moderate draught, according to tide, across the Outer shoal, for the anchorage. Vessels of deep draught should haul to the northward round Peak island, and bring it to bear between South and S. by E., astern, which will lead westward of Outer shoal and the 4-fathoms banks westward of it; when the left extreme of Blakang Mati bears S.W. by W. ½ W. (which bearing leads north-westward of Outer shoal), steer as requisite for the anchorage.

In working towards the dangers between St. John's islands and Blakang Mati, care must be observed not to bring Peak island eastward of S. by E. while mount Serapong is northward of W.N.W.; but when mount Serapong is westward of that bearing, a vessel may stand on until the western extreme of West St. John island bears S. by W. ½ W. The shoalest spots on Outer shoal will be avoided by not bringing Peak island westward of South, after the south extreme of Blakang Mati bears W. by S. The fishing stakes will give warning when a vessel is standing towards Malay spit. The south extreme of Blakang Mati, if not brought westward of S.W. by W. ½ W., will lead northward of Outer shoal; and large vessels not wishing to stand over this shoal, when outside or southward of it, should not bring Peak island southward of S.W. by S.*

From the eastward.—Small vessels bound to Singapore road from the eastward will have no difficulty, as they have merely to proceed to a convenient anchorage. Vessels of less than 15 feet draught may pass within the banks off Tanjong Katong, by keeping in the run of deep water, pretty close to the end of the lines of fishing stakes which extend out from that point.

It is the usual custom for sailing vessels belonging to the port, to keep these banks well aboard when proceeding to the anchorage from the eastward, when the wind is off the land and the tidal stream setting to the westward.

Vessels of heavier draught should keep well outside those banks, and with Mount Serapong bearing S.W. by W. ½ W., which bearing leads to the anchorage; or to avoid getting under a depth of 6 fathoms.

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Sampler No. 1,995; and chart No. 2,403.

SINGAPORE STRAIT, EASTERN PART.*

SOUTH SHORE.—The eastern part of Singapore strait east
of the Sambu islands, is formed by pulo Batam, an island of
siderable size lying on the west side of Rhio strait, and by the l
island pulo Bintang on the east side of Rhio strait.

BATAM BAY lies close eastward of Sambu island, a
7½ miles wide, and 2 miles deep, being bounded to the westwar
the two Sambu islands, and to the eastward by the peninsul
which Sikwang point is the north-west extreme.

The depths in the outer part of the bay vary from 10 to 20 fath
but close to the reefs extending from the shores, are depths of
7 fathoms, so caution is necessary in approaching them.

Three streams fall into the bay; the Mentaru, Lapi, and Jodu,
two latter are separated by Tanjong Oma.

Pulo Dangas, on the south shore of Batam bay, lies close to
point situated 1¼ miles eastward of Tanjong Pingi; with a
reef the whole distance between. The bay between this islet
pulo Bokok is free from danger, and vessels may anchor ther
about 5 fathoms.

Pulo Bokok, 4 cables in diameter, lies about that distance
Tanjong Liengsi; it is encompassed by the coral reef projec
from the shore, and which extends about 1½ cables beyond it.

Jodu bay is the name of the anchorage eastward of pulo Bo
and off the two streams, Jodu and Lapi. Two small reefs dry at
water, off the entrance of Jodu river, a third of a cable outside
shore reef which fringes the whole coast line from Sikwang p
to pulo Bokok, and obstructs the mouths of all the streams.

Vessels should enter the bay with the hill over Tanjong
bearing about S.E., and anchor in from 4 to 5 fathoms, with pulo Bo
abeam, and about 4 cables distant. The depths decrease sudd
from 7 to 3 fathoms towards pulo Bokok, but more regularly tow
the reefs on the opposite side of the bay.

Sikwang point and Tanjong Pingir are, respectively,
north-west and north-east extremes of a peninsula which separ
Batam and Bulang bays The land in the vicinity consists

* *See* chart of Singapore strait, No. 2,403.

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moderately elevated hills, and the coast line is fringed with coral extending from one to 2 cables off, near the edge of which are irregular depths of from 6 to 11 fathoms.

BULANG BAY, is $2\frac{3}{4}$ miles wide, between Tanjong Pingir and Tanjong Kapor and $2\frac{1}{3}$ miles deep, narrowing towards its head, into which fall the small streams Tring and Belie-an. Its shores are fronted by reefs which extend barely a quarter of a mile from the entrance points, but more than double that distance within them ; and from a point a mile south-eastward of Tanjong Pingir, a coral spit, with $2\frac{1}{2}$ fathoms over it, projects in an east direction nearly one mile.

A detached reef, part of which dries 3 feet, lies at the entrance of Bulang bay, with its outer edge E. $\frac{1}{2}$ N. one mile from Tanjong Pingir.

Anchorage.—The best anchorage is in about 6 fathoms, with pulo Nongsa bearing N.E. $\frac{1}{2}$ E., and the hill over Tanjong Kapor, East. Small vessels may go farther in.

Pulo Nongsa, one-third of a mile in extent, lies about three-quarters of a mile off Tanjong Batu Bla, the nearest point of pulo Batam. It is surrounded by a reef, extending about a quarter of a mile, between which and the shore reef are depths of 5 to 13 fathoms.

Rosa rock, nearly one mile E. by N. from pulo Nongsa, and 2 cables northward of the shore reef extending from Tanjong Burong, dries at low water, with 10 fathoms close to its north side.

Tanjong Burong, or Nongsa, is the northernmost point of pulo Batam ; the Malay village of Nongsa lies westward of it, fronted by a coral reef, dry at low water, to half a mile from the shore. Eastward of the point the shore reef, to the entrance to Rhio strait, projects three-quarters of a mile in places.

Rhio strait north entrance, lying between Tanjong Burong and Tanjong Sebong, and the dangers between them, are described on pp. 524 and 534, 535.

PULO BINTANG is the largest island on the south side of Singapore strait ; the north side of this island is about 16 or 17 miles in length, in an east and west direction, the greater part being taken

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described in detail. Like most of the other land forming the s of Singapore, it is covered with trees, and, excepting the hills inl is not much elevated.

Bintang Great and Little hills.—Bintang Great hill is situ about 6½ miles from the northern shore of the island, and ma seen in clear weather about 40 miles, being 1,253 feet high, and good mark in approaching the entrance of Singapore strait from northward. When viewed from that direction, it shows a sa shaped summit; and appearing to adjoin it on the north side, b reality 3 miles distant, is a conical hill, named False Bintan Bintang Little hill, 792 feet high.

Tanjong Pergam, lies 1½ miles eastward of Tanjong Sebo Subong (p. 535); the shore reef extends off only a short distance a group of islets, or large rocks, half a mile in extent, lies 4 c off the point.

Pulo Pergam lies half a mile south-west of it with several r above water extending nearly a mile beyond.

Langui shoal, about a third of a mile in extent with 1¾ fat least water, lies N.E. ¾ N. distant 1¾ miles from Tanjong Pe Close northward of this shoal are depths of 5 to 6 fathoms, 10 to 12 fathoms at a short distance; a bank with 2 to 5 fat extends nearly one mile south-westward.

Pulo Kra, open of Tanjong Sebong, bearing S.W., leads north of these dangers.

Tanjong Batu Sau, a prominent point on the north coa Bintang, having a small hill over it, lies 2½ miles eastward of Tan Pergam. The coast to the eastward as far as Peak islet, is front reef to the distance of one-third of a mile, with several rocks a water.

Between Tanjong Batu Sau and a bluff 2 miles westward, bay about one mile in depth, with its shores fronted by a reef rocks above water, to the distance of about half a mile.

Small vessels may anchor in about 4 fathoms in the middle o bay, avoiding Langui shoal, which lies in the approach.

Diana shoal, lies E.N.E. 4 miles from Langui shoal, S. by E. ½ E. distant 5¾ miles from Horsburgh lighthouse;

See chart, No. 2,403.

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about half a mile in extent, with a depth of $2\frac{3}{4}$ fathoms, and 6 to 8 fathoms a short distance north and south from it.

East and west of the shallow part, the bank, with a less depth than 5 fathoms, extends about half a mile. Isolated patches of 5 fathoms or less lie between it and Langui shoal. The north extreme of Tanjong Brakit bearing southward of E. $\frac{1}{2}$ S., leads northward of Diana shoal.

SUMPAT BAY lies between the point 2 miles eastward of Tanjong Batu Sau, with two small hills over it, and the western extreme of Tanjong Brakit. The entrance points of the bay are 8 miles apart. Its head and eastern part is fronted by coral reefs to the distance of one to $1\frac{1}{2}$ miles from the shore. The depths in the anchorage are from 7 to 10 fathoms.

Pulo Sumpat, a small island 178 feet high, lying in the eastern part of Sumpat bay, may be readily known by its saddle shape. It lies just outside the edge of the shore reefs.

A rock of small extent, with a depth of $2\frac{3}{4}$ fathoms, lies with pulo Sumpat summit bearing S.E. $\frac{1}{4}$ E., distant $2\frac{8}{10}$ miles.

A doubtful shoal, having $1\frac{1}{2}$ fathoms water over it, is marked on the chart N. $\frac{1}{4}$ E., distant 2 miles from pulo Sumpat, and $1\frac{1}{4}$ miles off shore. This shoal could not be found by the officers of the *Rifleman*.

TANJONG BRAKIT or Berakit, the north-east point of pulo Bintang, has some hills on its east side, one of which is 217 feet high, and others at one mile farther to the southward, with one 267 feet high. Reefs and foul ground extend from one to $1\frac{1}{2}$ miles off this point.

Pulo Brakit, 30 feet high, stands on the shore reef, at half a mile N.N.E. from Tanjong Brakit.

Black rock is a dark-coloured rock, one-third of a mile westward of the island, on the shore reef.

Pulo Kuku, 40 feet high, is narrow, and three-quarters of a mile in length ; it lies close-to and appears to form the eastern side of Tanjong Brakit. For coast southward, *see* p. 544.

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Bestillion reef, composed of coral and sand, with 2 fathoms

Brakit, with depths of 4 to 5 fathoms between. Patches of 4 fa
extend more than half a mile from this reef in a north-west dir

Brakit rock, one cable in length by half a cable in br
has a least depth of 3 feet, with depths of 4 to 7 fathoms clo
lies N.N.E. ½ E. distant $2\frac{6}{10}$ miles from Tanjong Brakit.
apex of Little Bintang hill well open westward of pulo S
leads westward of the rock. A conspicuous double tree on
4 miles southward of Tanjong Lokan, kept well open of T
Lokan, leads eastward of it; and Barbukit, about four times it
breadth, open eastward of Horsburgh lighthouse W. by N
leads northward.

Caution.—From the above description it will be seen th
whole of the north coast of Bintang is fronted with dangers, an
advisable that vessels should not attempt to come inside Dia
Langui shoals; these will be guarded against by keeping pu
open of Tanjong Sebong, until the north extreme of Tanjong
bears E. ½ S. Pulo Sumpat, bearing S.S.E., will lead to the we
of the shoals in the vicinity of pulo Brakit.

Tides.—It is high water full and change, at Tanjong Brakit a
springs rise about 12 feet, neaps 9 feet. (*See* tides, p. 204 and

THE NORTH SHORE.—General remarks.—Aspect
north shore of the eastern part of Singapore strait is formed
south-east part of Singapore island, Johor shoal, and Tanjong Pen
the south-east part of the Malay peninsula. The Rumenia i
with several rocks and dangers near them, together with Ru
shoals, North patch, and Eastern bank, extend eastward of T
Penyusuh nearly as far as the meridian of Tanjong Brakit.
outlying dangers will be described in detail; but the following
as they form convenient landmarks for navigating the strait, a
recognising the entrance from the eastward, will be first menti

Johor hill or Bukit Lanyut, 661 feet high, is of a r
oblong, sloping form, and covered with trees. Standing but a
distance inland from Tanjong Johor, the south-west point
Malay peninsula, it is one of the most conspicuous objects in Sin
strait.

Little Johor hill or Gunong Bau, 749 feet high, lies
5 miles northward of Johor hill.

See chart, No. 2,403.

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Barbukit, 645 feet high, lies 5½ miles westward of Tanjong Penyusuh; it is a regular pyramid rising from the low land, and is a useful object in making the strait from the northward.

False Barbukit, 432 feet high, is situated near the coast, and 6 miles north-north-eastward from Barbukit; it is a sloping hill, with a group of trees on its summit, a little more elevated than the coast, which is all rather low and wooded to the northward of the hills over Tanjong Penyusuh. It being discernible during hazy weather much sooner than Barbukit, renders it a useful mark when approaching Singapore strait from the northward.

EAST COAST of SINGAPORE ISLAND.—From Tanjong Katong (p. 224), the north-east limit of Singapore road, the coast trends north-eastward about 5 miles to Tanjong Bédok or Mengkuang; about midway between is the village of Siglap. Just to the northward of Tanjong Bédok there is a slight indentation in the coast line, known as Telok Mata Ikan (Fishes' Eye bay).

Red Cliffs.—The south and south-east coasts of Singapore island are level and wooded. The most conspicuous objects are the small Red cliffs (Tanah Merah Kechil), in a small bight just to the south-westward of Tanjong Bédok, and the large red cliffs, (Tanah Merah Besar), 3 miles north-eastward of them. The large Red cliffs are visible from a considerable distance to the eastward.

Tanjong Changi, the north-east extreme of Singapore island is low land with a white sandy beach, and forms the south-east limit of the Old strait of Singapore.

Red cliff bank is an extensive flat of mud and sand, with some patches of rock and coral, extending from the eastern part of Singapore island, between Tanjong Bédok and Tanjong Changi; its apex with a depth of 3 fathoms, is 3 miles off the large Red cliffs.

Buoys.—A red conical buoy, with staff and basket, in 7 feet water lies about 8 cables E. by S. from the rock which dries on the Red cliff bank; and a white conical buoy, with staff and basket, in 7 feet water, lies 3 cables eastward of the red buoy. Small craft approaching Johor channel from the westward should keep pulo Tekong Kechil

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Johor shoal fronts the east entrance of the Old strait of
pore ; it is about 2 miles in length east and west, nearly a qua
a mile in breadth, and composed of hard sand, having $1\frac{1}{4}$ fathon
water, and 2 to 3 fathoms elsewhere. Depths of less than 5 fa
extend about one mile to the eastward, increasing rapidly be
near the southern side are depths of 8 to 9 fathoms.

From a depth of $2\frac{3}{4}$ fathoms on the east extreme of the s
portion, distant $5\frac{1}{2}$ miles from the east part of Singapore island
Johor hill bears North, distant about $8\frac{1}{2}$ miles.

South Lima island open of South point bearing E. by N. $\frac{1}{2}$
East St. John's island bearing westward of S.W. by W. $\frac{3}{4}$ W
southward of Johor shoal. Little Johor hill bearing westw
N. by W. leads eastward of it.

At night, fort Canning light in sight bearing W. $\frac{1}{2}$ S. or
westerly will lead about one mile southward of Johor shoal.

JOHOR RIVER.—KWALA JOHOR, the approach to
river, is also the eastern entrance of Old strait, and lies betwe
dangers extending one mile southward from Tanjong Joho
Johor shoal and Red Cliff bank. It is about $2\frac{1}{2}$ miles wide abr
Johor shoal, with from 11 to 17 fathoms in the fairway, decr
to 9 fathoms towards Tanjong Johor.

Between Red Cliff bank and the bank southward of pulo T
Besar the channel is about $1\frac{1}{2}$ miles wide, with dept
7 to 13 fathoms; farther in between pulo Ubin bank ar
shallow bank eastward of it, the breadth is but three-quarter
mile, with depths of 7 to 12 fathoms.

Johor river is navigable, apparently, for vessels of mo
draught in charge of a pilot to Johor Lama, a distance of
10 miles.

Johor Lama, the old capital of Johor, was once a place o
siderable trade, but it has been supplanted by Johor Bahr
present seat of Government and residence of the Sultan (p. 24
contains about 20,000 inhabitants, chiefly Chinese.

Good water may be procured here, but nothing else.

Tanjong Johor is the bluff promontory forming the easter
of the entrance of Kwala Johor, and of the Old strait of Singap

Malang Berdaun, a group of rocks, one of which is several
height, lie about three-quarters of a mile south-eastward of Ta

See chart, No 2403.

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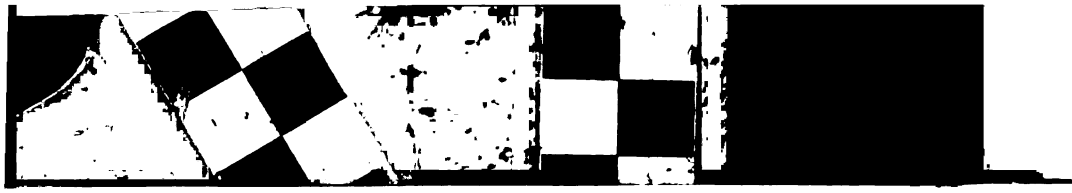

Johor, within the edge of the bank, which here extends three-quarters of a mile from the coast. Between Malang Berdaun and Tanjong Sitapa, the bank dries off about 4 cables.

The depths decrease suddenly from 7 to 4 fathoms towards the bank. Little Johor hill bearing N. ½ W. will lead westward of Malang Berdaun rocks; and South point open of Tanjong Sitapa, bearing East, will lead to the southward.

Tekong Besar, and Tekong Kechil, are the two islands lying north-westward of Tanjong Johor, at the entrance of Johor river, dividing that stream into two branches. Tekong Besar, as its name implies, is the larger island of the two, being 3½ miles in extent east and west, and 2½ miles north and south. Tekong Kechil, or Little Tekong, lying close to the west side of the larger island, is nearly round, its diameter being about two-thirds of a mile. There is an islet named pulo Sijongkong lying close to the south-east side of Tekong Besar; and another named pulo Sijahat, consisting of three rocks covered with vegetation, at three-quarters of a mile to the southward of Tekong Kechil.

A rock awash, having 6 fathoms close-to, lies 2 cables north-westward of pulo Sijahat, on the channel edge of the bank which surrounds both the Tekong islands; this bank is steep-to in places, and extends 1½ miles southward of Tekong Besar and 2 miles northward of it.

Kapala rocks appear to be three rocky heads awash, the outer one lying S. by E. ½ E. distant 1¼ miles from the south point of Tekong Kechil.

Directions.—In proceeding through Kwala Johor, Tanjong Changi should be approached on the bearing of N.W. by W. or more westerly, which leads eastward of Johor shoal and of Red bank, in not less than 4 fathoms until within one mile of the point; then course should be altered to N.N.W., until Johor hill is in line with the eastern Kapala rock bearing E. ¾ S., which mark kept astern will lead into Old strait southward of pulo Ubin. (For Old strait, *see* p. 246.)

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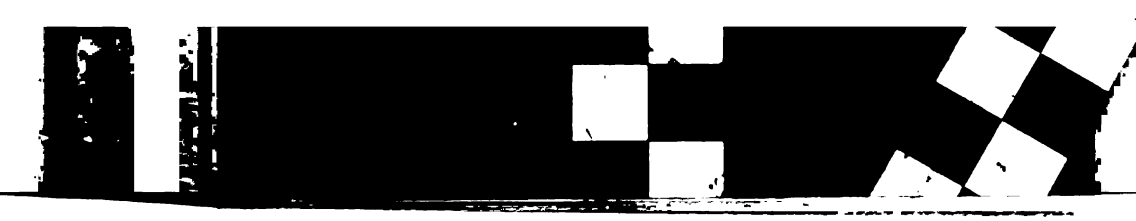

Calder harbour is the space between Tekong Besar an mainland eastward of it, northward of Tanjong Johor. The b of the harbour between the banks on either side is three-quar a mile, with anchorage in from 5 to 8 fathoms.

COAST.—Tanjong Sitapa, lying 3¼ miles eastward Tanjong Johor the west extreme of the Malay peninsula, is a what prominent point. The 3-fathoms edge of the shore bank a mile distant from Tanjong Sitapa and from the shore eastw South point, and should not be approached under a dep 7 fathoms.

South point, or Tanjong Tehimpang, the most sou point of this part of the Malay peninsula, lies nearly 4 miles ward of Tanjong Sitapa, with Tanjong Tiram between. South has depths of about 5 fathoms at about half a mile off it.

Tanjong Rumenía lies nearly 2 miles eastward of South Sungi Kalarang, a small stream, lies westward of it. The 3-fa edge of the shore bank is rather more than half a mile off the but from the head of the bight, between it and Tanjong Penj it extends 1¼ miles off.

Water island (pulo Rumenía), about half a mile eastward of Tanjong Rumenía, is a round island, about a quart mile in extent, with an islet off its south-west part connected by a reef, both standing on the shore bank.

Diana Cove.—Water.—Close westward of the south-we treme of Tanjong Penyusuh, is Diana cove, where there is a s of fresh water. Sungi Rumenía, at the head of the bight, is s have a depth of 2 or 3 feet at its narrow entrance at low wate to be navigable by boats for 2 or 3 miles, this is not borne out chart.

Water may be procured from this river, during the nort monsoon, but there are better and more convenient watering- in the sandy bays on either side of it. Within Water island th an excellent stream upon the main, where fresh water m obtained with facility in either monsoon; but in the nort monsoon the eastern streams are more convenient.

Good water can also be procured from the stream close rou rocky point, about 6 cables northward of Tanjong Penyusuh.

See chart, No. 2,403.

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Tanjong Penyusuh, the south-east extreme of the Malay peninsula, is level land covered with trees, with some small hills behind. Coral reefs extend off from one to 3 cables.

Tides.—At Tanjong Penyusuh, it is high water, full and change, at 10h. 30m.; springs rise 12 feet, neaps 9 feet.

Tanjong Pungei lies 4 miles northward of Tanjong Penyusuh, with a bight between about one mile in depth, mostly shallow water, and with outlying dangers, hereafter described. Pulo Pungei lies close southward of the point, and Sungi Pungei within it.

Tanjong Sitajam, lies about 4½ miles northward of Tanjong Pungei, within which is False Barbukit hill.

There is a considerable coast and riverside population, and frequent clearings, but the greater portion of the coast is covered with thick forest.

LIMA or FIVE ISLANDS, together with many dangers around and amongst them, front Tanjong Penyusuh; they extend nearly 2 miles in a north and south direction.

Caution.—As no advantage is to be gained by venturing amongst the Lima islands, it is best to consider the whole of the space occupied by them as impracticable for ordinary navigation, and avoid the locality.

Clearing mark.—Tanjong Sitapa in line with South point bearing West, leads clear to the southward of all the dangers near the Lima islands.

Large island, the westernmost and largest of the group, lies half a mile eastward of Tanjong Penyusuh; it is barely a cable in extent, but is conspicuous from being covered with trees. An islet lies about a cable north-eastward of it, both being situated on the same encircling reef.

South Lima, at 3 cables south-eastward from Large island, is small, covered with trees, and therefore easily discerned. A rock, 12 feet high, lies near its south point, with a reef of straggling rocks extending to the eastward which are bold to approach on the south side.

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Shoals.—A shoal of 2¾ fathoms, the existence of whi
doubtful, is reported to lie with Large island bearing N.N.E. 1¼ r
A patch of 4¾ fathoms lies one-third of a mile in a south-ea
direction from this position.

Peak rock, a remarkable barren rock, easily recognised
6 cables eastward of Large island. A rock awash lies close r
eastward of it, and patches of 4 and 5 fathoms between Peak
and Whale rock.

Stork reef, is about 3 cables in extent, and from its south
extreme Barbukit is in line with the north hump of Large Lim
latter distant a little more than one mile.

Congalton Skar, a rocky patch with 1½ fathoms, and
12 fathoms close-to, is the easternmost of the dangers off the
islands. From it the middle of Large island is in line with
rock, the latter distant one mile.

When the tidal stream is running to the westward, vessels pa
through North channel must be careful that they are not set too
this danger, of which the lead will not give timely warning.

Whale rock, about 6 cables north-east of Peak rock, is a
ledge which uncovers at about three-quarters ebb; it is steep-to
the depths around are irregular.

Jones reef, having one fathom water, and 8 to 9 fathoms clo
lies one mile north-eastward of Peak rock.

North island, very small, but covered with trees, lies 6 c
north-westward from Peak rock; shallow water extends 3 c
northward of it.

North rock, small and barren, lies nearly one mile northwa
North island.

A reef, about half a mile in extent, and with rocks above
lies between North island and North rock. There are several pa
between it and North island.

RUMENÍA SHOALS are a number of detached patch
sand and coral, stretching in a north-easterly direction fron

See chart, No. 2,403.

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Lima islands, towards North patch. Between these patches are depths of 8 to 10 fathoms water in places; they are steep-to on their eastern and southern sides there being depths of 14 to 17 fathoms at a short distance.

Within a depth of 5 fathoms, these shoals extend $2\frac{1}{2}$ miles in a north and south direction, and are nearly half a mile wide. The north extreme lies with Horsburgh lighthouse bearing S. by E. $\frac{1}{2}$ E. distant 6 miles, and the south-west extreme lies with the lighthouse bearing S.E. $\frac{1}{2}$ S. $4\frac{1}{3}$ miles. The shoalest spot, $2\frac{3}{4}$ fathoms, rock, lies near its centre, is about half a mile in extent and steep-to on its south-east and north-west sides.

Rumenía shoals are connected with North patch by a ridge on which the depths are under 10 fathoms, with many isolated patches of 5 fathoms and possibly less water; also between the shoals and the Lima group are similar patches; vessels therefore should pass eastward of this ridge.

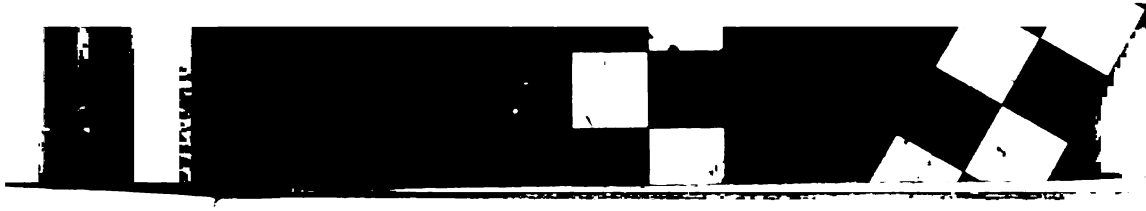
North patch lies N.E. by N. distant $7\frac{1}{2}$ miles from the shoalest part of the Rumenía shoals. It is nearly one mile in length, north and south, by one-third of a mile in breadth, having depths only of $3\frac{3}{4}$ and 4 fathoms, and composed of mud and sand. From its north end False Barbukit bears W. $\frac{3}{4}$ S. distant $12\frac{1}{4}$ miles; and Horsburgh lighthouse S. by W., distant $11\frac{1}{4}$ miles.

About three-quarters of a mile S. by E. $\frac{1}{2}$ E. of North patch there is a patch of $3\frac{3}{4}$ fathoms.

Clearing marks.—South point just open southward of South Lima island, bearing W. by S. $\frac{1}{2}$ S., leads southward of Rumenía shoals; and Horsburgh lighthouse in line with the west apex of Bintang Great hill, S. by E. $\frac{1}{4}$ E. leads eastward of Rumenía shoals, in about 6 fathoms water, and between them and the 5 fathoms patches which lie one mile to the eastward; this track over the ridge is not recommended for other than light draughts.

Bintang Great hill, open to the eastward of Bintang Little hill, leads half a mile eastward of North patch, and clear of all dangers on the ridge connecting it with Ramunía shoals.

Eastern bank, the outermost of the known banks off Tanjong [illegible] to Singapore strait, is nearly $1\frac{1}{2}$ miles in



around. It lies about 6 miles within the range of Horsb light, and from its northern edge the light bears S.S.W. $\frac{5}{8}$ W. di 14 miles.

PEDRA BRANCA, or White rock, lying in the midd the eastern entrance of Singapore strait, from 7 to 8 miles from e shore, is 150 feet in length, 100 feet in breadth, and 24 feet high will be readily known by the lighthouse, which was erected on 1851, and named after the celebrated hydrographer, Horsbu whose labours have in a high degree benefited the interes navigation and commerce in every part of the Eastern seas.

HORSBURGH LIGHT.—From the circular, granite lighth 112 feet in height, on Pedra Branca, painted in black and v bands, is exhibited, at an elevation of 101 feet above high wa *flashing white* light, showing a *flash every ten seconds*, visib clear weather from a distance of about 16 miles.

Middle rocks.—A patch of 4 fathoms, steep-to, lies 3 c north of the lighthouse. Shallow patches extend one third mile eastward of Pedra Branca, and about two-thirds of a mile s east and south of it. Middle rocks, the southernmost of t are a little above the surface at high water.

South ledge, visible at about half ebb, consists of three dang pointed rocks, with 8 to 9 fathoms close-to, and 16 to 18 fat at a short distance, with Horsburgh lighthouse bearing N. by E. distant 2 miles.

A head with 12 fathoms water, and from 20 to 30 fathoms ar has been found $2\frac{1}{4}$ miles S.W. by W. $\frac{1}{2}$ W. from the lighth One of 10 fathoms is charted $5\frac{1}{2}$ miles in that direction, an bottom is irregular between.

TIDES.—Current.—It is high water, full and change, at burgh lighthouse and the eastern portion of Singapore strait 11h. subject to considerable irregularity. The velocity of the n eastern or ebb stream is generally greater than that of the s western or flood streams in both monsoons; when strongest, it from 4 to $4\frac{1}{2}$ miles an hour. Neaps run from 2 to 3 miles an but are very irregular. In the strength of the north-east mon when the current runs from the China sea towards Singapore

See chart, No. 2,403.

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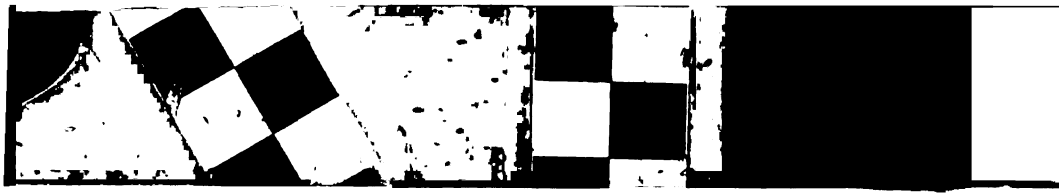

the south-western stream sometimes runs for 10 or 12 hours at a time. Again, at about full and change, the north-eastern stream often sets out strong during the night, for 10 or 12 hours together; at other times it is changeable and not strong; it has been sometimes observed to set all round the compass during the night, and once N.N.W. 2 miles an hour directly over Rumenia shoals. (*See* tidal arrows on the chart.

In making Singapore strait from the northward, vessels should always be prepared to meet with a current running to the southward in the north-east monsoon, and the northward in the opposite season, the strength of which is governed by the strength of the monsoon. In fine weather its rate is usually from 1½ to 2 knots an hour, but the rapidity of the current is also accelerated or retarded by the tidal streams near the coast. Between Horsburgh lighthouse and a position 40 miles to the eastward, it has been known to set at the rate of from 3 to 4 knots an hour.

DIRECTIONS.—Singapore road to the eastward.—Having cleared the road, course may be shaped about E. ½ N., and by not bringing the flagstaff on fort Canning to the southward of W. ½ S. as long as it remains in sight (or the light kept in sight at night), will lead southward of Johor shoal. When Johor hill bears North, the vessel will be eastward of Johor shoal, and may steer for Horsburgh lighthouse, and passing about one mile to the northward of it, proceed into the China sea as convenient.

To work through the eastern part of Singapore strait.—Sailing vessels will experience no difficulty in working in either direction through the eastern part of the strait. The best plan is to keep towards the north shore, in case of having to anchor, as the depths are more convenient on that side. The shore may be approached to 12 or 11 fathoms; South Lima island kept open of South point leads southward of Johor shoal, and, when standing towards this danger, if these objects cannot be seen, preserve the depths mentioned, for the shoal is steep-to.

When eastward of South point keep Tanjong Sitapa open, until South Lima island bears westward of North; and, when standing towards Stork reef and Congalton Skar, South point should not be [illegible] southward of W. ¾ S. A vessel may stand towards Rumenia

There are no dangers on the south side of the strait, exc those fronting the Bintang coast, and the Crocodile and Pan &c. But a vessel should not stand so far over as to get near dangers, for no advantage will be gained by doing so, an depths there are inconveniently great for anchoring. Pulo N lying just to the westward of the entrance to Rhio strait, is convenient for taking bearings to avoid the dangers in the app to that strait, and if kept bearing southward of West will lead ward of them all.

From the China sea.—Middle channel, between Horsl lighthouse and Rumenia shoals, is the main entrance to Sing strait from the north-eastward.

The entrance may be easily recognised, if the weather be cle Bintang Great hill, a remarkable Saddle hill on Bintang island Barbukit, the sharp-peaked hill on the opposite side of the Bearings of these objects will serve to determine the v position, and guide her in shaping a course to sight Horsburgh house.

Departing from pulo Aor (Vol. II.), steer to bring it to bear North when disappearing; if the weather be clear, Bintang hi pulo Aor may be seen together, but this seldom happens. Bi Great hill, open eastward of Bintang Little hill, leads eastwa North patch.

In making the entrance at night, if the vessel's position be k it will be merely necessary to stand on boldly for the light, m allowance for the set of the stream; and when the light is steer so as to pass about from one to two miles northward of it. Tides, p. 239.)

In hazy weather, having pulo Aor disappearing about No course S. by W. to S.S.W. may be requisite if the north-e stream is running out of the strait. The depths will dec regularly in steering southward, and the low land will probal seen to the westward when in 20 or 18 fathoms; if so, coast it at 10 or 12 miles distance, until False Barbukit, a low sloping h discerned, appearing like a clump of trees more elevated tha others. When this hill bears W.S.W. a depth of 15 fathoms fair track; with it bearing W. ½ S., overfalls in 16 to 13 fathom be experienced, or probably less water, being then on abou parallel of the North patch and Eastern bank.

See chart, No. 2,403.

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With False Barbukit bearing W. ½ S., if a cast of 10, 9 or 8 fathoms be got, but uncertain whether these soundings are near the North patch, or on the shallow part of Eastern bank, haul to the south eastward until in 14 or 15 fathoms. Then steer South until False Barbukit bears West, when the vessel will be to the southward of Eastern bank; she may then haul in W.S.W., and get a cast of 10 or 11 fathoms, and will then be certain that these soundings are on the outer edge of Rumenía shoals. But in doing so, heave the lead quickly, and if there be less than 10 fathoms, haul out directly eastward into 15 or 16 fathoms, and then steer along the south-east edge of the shoals in 16 or 17 fathoms. If when Horsburgh lighthouse should be discerned, it bears S.S.W., or more westerly, the vessel will be eastward of the shoals. Having steered round the shoals so far as to bring the lighthouse S. by W., do not come under 16 or 17 fathoms in passing along their southern part; for they are there steep-to, decreasing from 16 to 12, and from 12 to 3 fathoms at a cast, on some of the patches. South point just open of South Lima island leads southward of all the Rumenía shoals.

Sailing vessels should not approach Horsburgh lighthouse within one mile, as the tidal stream runs strong, and there is danger of being drifted on to the rock in calms or light winds.

Having passed between Rumenía shoals and the lighthouse, and bound to Singapore road, the course is about W. by S., taking care if on the north side of the channel to have Tanjong Sitapa open of South point, before South Lima island is brought to the eastward of N. by E. When near Johor shoal, South Lima island kept open of South point will lead southward of it; thence to the road the course is about W. ½ S. The vessels in the road will be a guide in approaching the anchorage, and as Tanjong Katong is neared, the flagstaff on Fort Canning hill overlooking the town should not be brought to the westward of W. by N. ¼ N.

If the tidal stream be running to the westward it is the usual practice for sailing vessels to keep well over on the north side of the channel, especially in light winds, for, neglecting this precaution they have often been swept by the rapid current past Singapore road and the St. John's islands (the deep water, 45 or 50 fathoms, rendering it difficult or impossible for them to anchor) into the western part of the strait.

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At night keep a good look-out for Horsburgh light, which, being

visible in clear weather at the distance of 16 miles, will be in
before the vessel can get near the dangers at the entrance o
strait.

The light being brought to bear S.S.W. will lead eastward of
patch and Rumenía shoals. When at about 2 miles from the li
W.S.W. course may be shaped until the light is brought E. b
when keep it on that bearing, astern, until the light on fort Ca
at Singapore, which is visible when bearing westward of W.
comes in sight. But in case it should not be distinctly
out by the time Johor hill bears N. by E., do not come
16 or 17 fathoms towards Johor shoal; and if a cast of
11 fathoms should be had haul quickly to the southward, fo
shoal is steep-to, and should not be approached under that d
Fort Canning light may be approached on bearing West, unti
eastern extreme of Singapore island bears North; from when
light should gradually be brought to bear to the northwa
W. by N., as Tanjong Katong is approached.

It is necessary in a sailing vessel, to observe the precauti
keeping on the north shore of the strait when nearing Sing
road at night, for although a vessel may have entered the
with a strong north-east monsoon, yet as she nears the roa
wind will, in the night, generally draw off the land fro
north-westward, making it always difficult and sometimes impo
to fetch into the road or get into a convenient depth of wa
anchoring.

If bound into the strait of Malacca, when abreast Johor
with fort Canning light in sight, course may be altered to
W.S.W. for St. John's islands, observing that Raffles light is
from about 5 miles eastward of those islands, when bearing
ward of S.W. by W. $\frac{3}{4}$ W., and leads clear of all dangers nort
of it. A vessel should steer to pass within a short distan
St. John's islands, avoiding the south side of the strait; the
light bearing W.S.W. is the fair channel mark. Thence pas
light at a prudent distance, and shape course for Malacca strait.

South channel is sometimes convenient for sailing vessels
the eastward which fall to leeward of Horsburgh lighthouse d
thick weather, as they have no occasion to anchor outside. If the
be north-easterly, they may run down until within 4 or 5 miles
the Bintang shore, remembering that Barbukit must be kept

See chart, No. 2,403.

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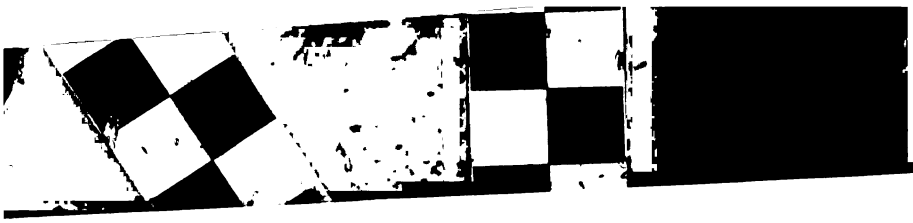

times its own breadth open northward of Horsburgh lighthouse, or the lighthouse kept westward of W. by N. to clear Brakit rock; then haul to the westward, and pass nearly in mid-channel between the shore and the lighthouse, in 11 to 13 fathoms of water. With the wind at N.W. or North, it will be advisable to borrow nearer to South ledge than to the Bintang shore, observing not to approach too closely to South ledge, as it is covered at half flood. By borrowing towards the weather side of the channel, vessels will be enabled to reach well into the entrance of the strait; and if the wind be scant and the tidal stream against them, they will have smooth water and good bottom for anchorage, until the stream is favourable for proceeding to the westward.

North channel lies between Rumenia shoals and the dangers outlying the Lima islands, and is about 3½ miles wide; banks of 4½ and 5 fathoms lie in the fairway, but there does not appear to be any less water, and it is frequently used by those locally acquainted.

The directions on p. 241 apply as far as the Lima islands. As there are no leading marks, the navigator must exercise his own judgment —bearings of Horsburgh lighthouse and of Tanjong Sitajam afford sufficient guide for this channel.

In working through it must be borne in mind that most of the dangers are steep-to.

OLD STRAIT OF SINGAPORE OR SALAT TEBRAU.

General remarks.—Old strait of Singapore, the channel between the northern shores of Singapore island and the Malay peninsula, was formerly the passage by which all vessels proceeded between India and China, when the Main strait at present in use was not known to be navigable. Its western entrance has very much filled up, even since Horsburgh's time; he gives 3½ fathoms as the least water, but there is now a bar of sand, with but 2 fathoms water, stretching across from Tanjong Gul to Tanjong Bulus. The eastern entrance is used by most vessels visiting Johor Bahru, usually of light or moderate draught; though the channel prevents no great difficulty it may be advisable to employ a pilot on a first visit.

Johor Bahru (New Johor) near Tanjong Petri, on the north side

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of the middle of Old strait, is the capital of the territory of

(*See* the State, p. 6.) It is a flourishing town of about 1
inhabitants, the seat of Government and the residence of the Su
it presents a most picturesque appearance viewed from Singa
island on the opposite side of the strait, built as it is along
shore, with the surrounding hills dotted over with bungalows
well laid out gardens. Facing the sea is the Istana Laut,
principal residence of the Sultan; there are good roads to
interior, an esplanade over a mile in length, airy hospitals, w
works, wharves, and extensive saw mills, for the purpose of cu
up the timber as it is brought from the adjacent forests.

Telegraph.—Ferry.—There is telephonic communication
Singapore. Both at the town, and also opposite on Singapore is
there is a ferry pier.

Anchorage.—There is anchorage about 2 cables off the tow
about 9 fathoms, mud, with the palace flagstaff bearing N. by
and the public offices N.E. There is a depth of 5 fathoms wi
20 yards of the pier, which is only about 15 feet in length.

Tides.—The tidal streams meet off Tanjong Petri, and during
stay of the *Hyacinth*, from 20th to 22nd February 1892, the ve
swung twice in 24 hours. The velocity of the stream varied f
half a knot to 1½ knots. There were, however, two high waters in
24 hours.

Eastern entrance.—Sarangong harbour.—The eas
entrance of Old strait is between Tanjong Changi and Tanj
Kopo on the Malay peninsula (approached by Kwala Johor, p. 2
and is divided into two channels by pulo Ubin. The coast wit
Tanjong Changi trends westward for about 1½ miles, when it rece
forming Sarangong harbour, 3 miles wide. About one mile w
ward of Tanjong Changi is a small river, with a few bungalows
a police station near it.

Several streams discharge themselves into Sarangong harbo
the principal of which, the Sarangong, is at its western extre
About 1½ cables westward of Fairy point are two white ro
(Batu Putih), 12 feet high, with deep water close-to. The depths
the harbour are from 7 to 12 fathoms, decreasing rather sudde
under 6 fathoms.

See chart, No. 2,403.

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Pulo Sarangong lies about one mile off the entrance of Sarangong river, but the mudbank which fronts the coast includes this island.

Pulo Ubin is about 4 miles in length, in an east and west direction, and one mile in breadth. A shoal bank extends three-quarters of a mile from its east end, and one mile in a south-easterly direction, close to which are depths of 4 to 8 fathoms. Pulo Sikodo, encircled by a reef lies off its south-east extreme; Papan, a sunken rock, lies 1½ cables south of it. A 3-fathoms patch also lies about 2 cables off shore, south-eastward of Pinang Rawang. Westward of the south point of pulo Ubin is pulo Kétam, with patches of reef extending from both its extremes.

Bentan.—At Bentan, north side of Old strait, westward of pulo Ubin, is a flagstaff and a wooden pile pier.

DIRECTIONS.—Old strait.—Eastern entrance.*—The channel northward of pulo Ubin is the better of the two. By keeping within half a mile of pulo Sijahat (a group of three islets) the shoals off pulo Ubin will be avoided. When the north extreme of pulo Tekong Kechil bears E. ½ N., course may be altered to pass in mid-channel northward of pulo Ubin; thence keeping to the northern side of the strait, distant about 3 cables, the lead giving sufficient warning if too close. From abreast pulo Khatib Bongsu, keep in mid-channel until abreast Johor Bahru (New Johor).

The navigable channel southward of pulo Ubin is half a mile wide, with depths of 12 fathoms, but the shoals are steep-to on either side. The eastern Kapala rock in line with Johor hill bearing E. ¾ S. astern, leads through in mid-channel to abreast pulo Sikodo and the sunken rock off it. Thence steer, through Sarangong harbour, passing fairly close northward of Batu Putih rocks to avoid the 3 fathoms patch and the mud flat extending off the south point of pulo Ubin. When the west extreme of pulo Ubin is well open of pulo Kétam, borrow on the north shore to avoid the bank extending eastward of pulo Sarangong; thence to Ayer Biru, and keep to the north side of the strait as when passing northward of pulo Ubin.

Western entrance.—The western entrance of Old strait has a bar with a low water depth of about 2 fathoms at one mile southward of pulo Merámbon. Within the bar the water deepens to 4 to 5 fathoms eastward of pulo Merámbon.

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About 7 miles north-eastward of that island is the narrowest of the strait, and about one mile beyond some rocks covered at water, lie in the fairway.

This channel should only be used with local knowledge, as chart is unreliable.

Beacon.—A red stone beacon, with basket, marks the coral l lying on the east side of entrance, 1½ miles eastward of Merâmbon.

Water.—Fresh water may be obtained in several of the str in Old strait.

See chart, No. 2,403.

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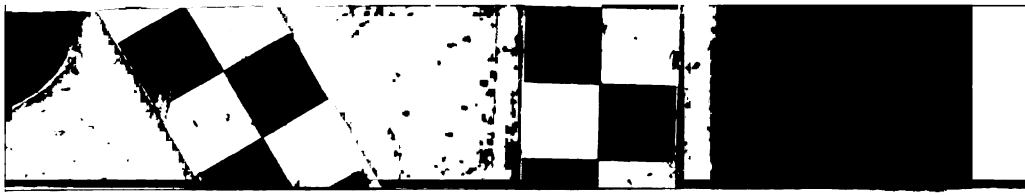

CHAPTER V.

WEST COAST OF SUMATRA AND OFF-LYING ISLANDS.

VARIATION IN 1896.

Sumatra, west coast ... ... 2° E.

General remarks.*—In outward appearance the west coast of Acheh, the northern portion of Sumatra, differs entirely from the east and north coasts. In the latter portions there is a considerable alluvial plain almost all along the coast, with here and there a chain of hills extending nearly to the sea, and with a regular coast line. On the west coast there is for the most part a high rocky coast, or if there is a strip of strand by the sea, the land rises rapidly behind it to the neighbouring hills; it is only between Ketapang Pasir and Tanjong Raja or Teku (lat. 4° 38′ to 3° 43′ N.), and south of the mouth of the Kluat river (lat. 3° N.), that there is a plain of any breadth on the coast. (For a description of Sumatra island, *see* pp. 6–8.)

Numerous small streams discharge their waters on the west coast, but most of them are barred, and only navigable by canoes. An almost unbroken chain of mountains extends southward from Acheh head parallel to the coast line, at a distance of 6 to 8 miles, known as the Barisan or Gunung Itam range; the principal peaks will be mentioned with the portion of the coast adjacent to them.

Caution.—The coast line is deeply indented, forming numerous bays, none of which, however, northward of Tapanuli afford complete shelter during the south-west monsoon period. There are many visible and sunken dangers off the coast, but northward of Tanjong Raja or Teku, they do not extend to any great distance; southward of that point they extend from 20 to 30 miles off, and from the incomplete surveys many dangers no doubt exist that are not charted, so that considerable caution is necessary at all times. Numbers of them are coral reefs, steep-to, of which the lead will give no notice, requiring a good look-out aloft to be kept during daylight, and to

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Vessels visiting places on this coast should be on their
against being surprised by the natives, and never allow armed p
to come on board, nor unarmed ones in any number. (*See* foot
p. 260.)

Winds and weather.—*See* pp. 22-24, and 14, 15, respecti

ROUTES.—General remarks.—The routes along the
coast of Sumatra may be considered as three in number, bu
Outer route only, in the open sea, may be said to be free from da
as the coast is practically unsurveyed.

For a sailing vessel, the voyage in either direction and
seasons, is long and wearisome, owing to the frequent calms, bu
generally more difficult to work northward than southward,
to the prevalence of south-easterly currents, which may be l
for even with and after a southerly wind.

January and February are the best months for going north
while in September, October, and November, vessels will oft
compelled to keep far out to sea in order to make even a
northing; working in shore during these months is
impracticable.

Outer route.—The route to the westward of all the islan
the open sea, is the best of the three, more especially for s
vessels and others not intending to touch at any of the west
ports. South-west and southerly winds often prevail here,
north-west squalls, variable baffling winds, calms, and sou
currents, may be experienced close to the land. A quicker voy
the northward will thus be made during either monsoon. If tou
at any of the ports, they may be steered for when on their par

Middle route.—The Middle route is the space between the
of large islands, in the offing, and those small islands adjacent
interspersed along the coast, and ranges from 10 to 30 miles di
from the coast of Sumatra. It is frequently taken by Dutch
of war, and the coastal mail steamers running between Batav
Acheh, *viâ* the coast ports.

It should not be followed by a sailing vessel when bound to the
ward, nor at any time, if it can be avoided without inconven
for although it is wide, and may be adopted by night or d
light draughts, when the weather is clear and favourable,

See charts, No. 2,760 and 2,761.

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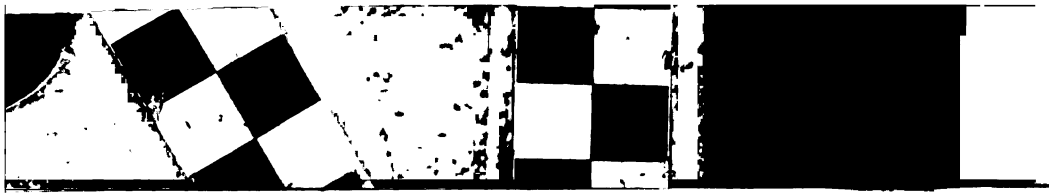

are more at the mercy of the currents when the winds are light and baffling, and there is no anchorage; in some parts there are dangerous coral shoals, of the approach to which the lead will give no warning.

Inner route.—The Inner route is that close along the coast and between some of the islands and dangers off it. It, like the Middle route, should seldom be chosen by sailing vessels bound to the northward in either monsoon; but as there are in many places moderate depths for anchoring, it is preferable in that respect to the Middle route. Vessels visiting many of the ports are obliged to take it, but considerable risk is run when taking this route at night; those using it are generally obliged to anchor at sunset.

Pilots.—Men possessing some local knowledge are obtainable at Padang, and possibly at Acheh, but too much dependence must not be placed on them.

Tides.—There is but little tide on this coast, the rise being only from 2 to 3 feet, the flood setting northward and the ebb southward. The tidal influence does not extend above 4 miles from the coast. The current is more often south-easterly than north-westerly in the offing; but during the south-west monsoon, it sometimes sets northward for many consecutive days. (*See* currents, p. 27.)

ACHEH HEAD to RIGAS BAY.—Aspect.—The coast between these two points, about 57 miles apart, is very irregular, has many prominent headlands, with bays between, none of which afford secure anchorage during the south-west monsoon period. The coast is steep and rocky from Acheh head to the north side of Krung Raba bay, beyond which sandy bays occur. In most places the land rises sharply to the hills within; the principal exceptions are the low land in Krung Raba bay, which continues through the kloof or cleft into the Acheh valley, and the valley of the Lambesoi river, between Gle Eh Manuk point and Jinamprong, which forms a conspicuous break in the Barisan range. The coast is thinly populated owing to the frequent wars and the prevalence of fever, consequently only a few villages exist; the pepper cultivators live further inland.

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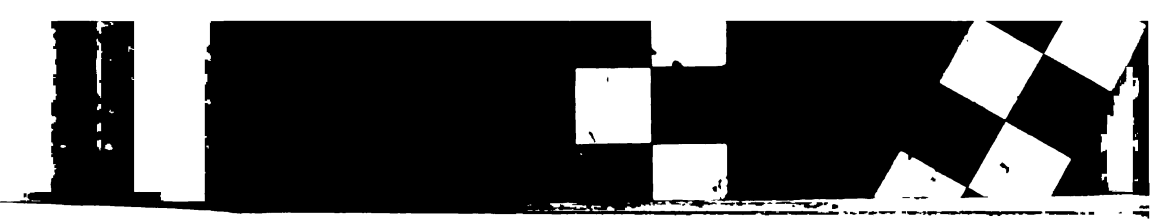

in most places, but they are generally seen by the surf breaking them. There are numerous prominent headlands and mountai means of which the vessel's position is easily ascertained. Nea shore, the bottom is sand, or sand and coral; near pulo Raja sand and mud, or mud, in depths of 8 fathoms and beyond.

The indifferent bottom almost everywhere, and the heavy swell, and poor shelter from westerly winds, renders most plac this portion of the west coast undesirable anchorages, and v must be ready to leave them at any moment.

Landmarks.—Mountains.—The following mountain tops be recognised and are useful marks when navigating along this

Gle Raja, the summit within Acheh head, has been referr on p. 50.

Gle Karang, 682 feet in height, is easily recognised; it is sit on the tongue of land forming the north side of Riau bay.

Gunong Kruit, a conspicuous green hill 1,037 feet high, w bare round top, is situated on the tongue of land separating Ria Lehong bays.

Batu Mukurah or Chupeh, 6,371 feet high, is a sharp peak 15 within Gunong Kruit. Gunong Puchit Puding, 6,122 feet hi the highest and southernmost point of the ridge, whose spurs e to the sea at Riau and Sedoh bays. The mountain is precipito the south side and is usually to be distinguished at night if clos

Timbaga or Tembaga hill, a truncated cone 856 feet in heigh good landmark; it lies on the north side of Daya bay and des steeply to the sea. There are many caves in the hill conta edible birds' nests. Southward of the Tembaga is a low ridge of which when seen from the southward appears as a sharp-peaked

Raja hills are two hills close together; the westernmost higher of the two is 1,840 feet in height. Bukit Midang, 886 f height, is the summit of a promontory in Raja bay. Gunong I 1,289 feet in height, just northward of Rigas bay, is a good mark, and visible in clear weather from a distance of 40 From the south-eastward it appears as a cone, with a few westward of it; from the north-westward two summits wi seen, the northernmost being the lower. Its south-east side is cle and looks like cultivated land.

Gunong Sikawit, 3,173 feet high, about 8 miles within I appears as two peaks, rising high above the intervening hills, abreast it.

See charts, Nos. 219 and 2,760.

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Singa Mata, about 30 miles from the coast, is 5,151 feet in height and the summit of an inland range ; (mountains, continued on p. 264).

COAST.—Ujong Raja, or King point,* about 3½ miles southward of Acheh head (p. 50), is a lofty promontory rising precipitously from the sea, and easily recognised from all directions ; there are depths of 12 fathoms at a short distance. Sailing vessels bound through Surat passage will find temporary anchorage here, should the wind and current be unfavourable. There are two coves between King point and Acheh head which afford good anchorage for small craft.

KRUNG RABA BAY, between King point and Ritieng point, is about 4 miles wide ; the mountains on either side make it appear as a valley when a considerable distance off, and it has been mistaken for Surat passage.

Krung Raba river discharges into the bay by three mouths, the southernmost of which is at times available for boats, but there is always a considerable surf. A coral reef half a mile wide and 1½ miles in length, fronts these mouths and the coast northward ; and there is a coral patch of 3¼ fathoms, on a continuation of the reef, at 3 cables off the cove in the northern part of the bay.

The bay affords anchorage during the north-east monsoon, in about 12 fathoms, over sand and coral, which depths exist near the shore in the southern portion of it. Some rocks above water lie close in shore here.

There is also good anchorage in the cove in the northern part of the bay, within the reef, in about 7 fathoms ; the conspicuous tree at the head of the cove, bearing E. ½ S., leads in northward of the reef.†

Ritieng point is a precipitous headland with a rock above water close off it and depths of 12 fathoms just beyond. The village of the same name is situated on the creek southward of it.

Barba and Lepong are the shallow extremes of the passage within the island close to the shore, southward of Ritieng point.

SIDOH, or Seduh bay, 5 miles southward of Ritieng point, lies between the two precipitous headlands of Sidoh and Pulut, which are fairly steep-to, but a coral reef with a rock awash extends

mile in extent and affords fairly good anchorage for small cr
3 fathoms. There is anchorage in 7 fathoms, mud, with Pulu
N.E. by E. about 3 cables, but vessels must be prepared to
this at any moment.*

Batu Mandi is the name given to three rocks above
situated about one mile south-west of Sidoh point ; there is a
of 9 fathoms in the passage between these rocks and the
above water extending off the shore nearly abreast.

Amboina bay (Lok Paroi), about one mile in extent, a
anchorage in 5 to 6 fathoms, but is open to the westward. A
reef extends off the point on the south side of it.

Perling rocks, above water, extend about one mile off shore
same distance southward of Amboina bay, with depths of
10 fathoms inshore of them. Two of the rocks have trees gr
on them, and the largest rock is known as Batu Buja.

OUTLYING REEFS.—Aart van Nes is a coral patch
6 fathoms least water, and about 10 fathoms around, in the
abreast Krung Raba bay, with Ritieng point bearing E. ¾ S. 1
5 miles.

Cuhurn reef, about 6 miles southward of Aart van Nes,
least depth of 7½ fathoms, and from 9 to 12 fathoms around,
Sidoh point bearing E. by N. ¼ N. distant 3¾ miles.

Sindora reef is about one mile in length, north and sout
half a mile in breadth, with depths of 5¼ to 7 fathoms ; it is ste
there being 30 fathoms close to on its western side and 10 to
the north and east sides. From the shallowest spot near its
extreme, pulo Rusa bears S.E. ¾ E., distant 4¼ miles.

COAST.—Pulo Rusa (lat. 5° 15½′ N.), 302 feet in heig
about one-third of a mile in extent, and situated about the
distance off the north-west point of Riau bay ; there are two p
of about 6 feet water in the channel between, and a similar
just off the south extreme of the island. The island is th
wooded, has a jagged coast-line, and there is sandy beach o
south-west side, where near a group of cocoanut trees, landing m
effected at times. There is anchorage in the channel within, ave

* *See* plan of Sidoh bay on No. 2,284 ; also chart, No. 219.

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the rocks mentioned and which will usually be marked by breakers; the Rusa shore should be kept, where there is not less than 6 fathoms. Buga point, abreast, on the main, is a precipitous black and rocky promontory, 682 feet in height, forming north-west side of Riau bay.

RIAU BAY (Lok Belang Raja), is about one mile in extent, with exposed anchorage in 7 to 8 fathoms, sand. There is usually considerable surf in the northern part of the bay; the best landing is then in the south-east corner. There are small villages on the shores of the bay.*

Tiba point, the south extreme of the bay, is a rocky promontory and a spur of Gunong Kruit or Green hill, 1,037 feet high (mentioned on p. 251), and separates Riau bay from Lehong bay.

A coral patch of 9 fathoms, with depths of 16 fathoms around, is situated in the offing, with pulo Rusa bearing N.E. by E. ¼ E., distant 5¾ miles.

Lehong, or Loöng bay is exposed to westerly winds, but affords anchorage during fine weather, in 5 fathoms, with Puderut, the rocky headland forming its south point, bearing S.W., within the rock with one fathom water which seldom breaks, situated N. by W. 2½ cables from the point. Between the rock and the point there is a depth of 7 to 8 fathoms; there are no other dangers in the bay more than 50 yards off-shore. The northern portion of the bay is known as Lok Tiba, and the southern as Lok Puderut.

Puding point, 2½ miles southward of Puderut point, is a low headland with a reef extending nearly one mile off it. Pulo Rusa, open of Puderut point leads seaward of it. Sidagung point to the southward of Puding point, is a steep and rocky point with depths of 7 fathoms close-to.

KLUANG or KELUANG BAY† (lat. 5° 7′ N.), affords anchorage for small craft in about 7 fathoms eastward of the island; but is open to north-west, and there is considerable swell here during the south-west monsoon, rendering it with strong winds an undesirable anchorage. The bay is sandy on its south and east shores, and the village of Keluang lies on the banks of the Lamtui creek. Drinking water of indifferent quality is obtainable.

Pulo Kluang is a rocky islet about 300 yards in length, with [illegible] cave exists in the island

containing quantities of edible birds' nests. There is a p
2½ cables wide between the island and the main, with depth
to 8 fathoms; the island shore should be kept by craft using it

Daweh point, a narrow and precipitous tongue of land termi
in two headlands, separates Kluang and Daya bays; there is
water off the headlands, but the coast between them is fronte
reef.

Batu Burung consists of several rocks above water on
half a mile in diameter and nearly dry at low water, with dep
14 to 16 fathoms between it and Daweh point; border towar
main if using this passage.

Daya bay is about 2 miles in extent and open to westerly
the best anchorage is in 6 fathoms, sandy bottom, with Tanjo
S.W. and the south end of the village S.E. The Tembag
856 feet high, mentioned on p. 251, descends precipitously to
on the north side of the bay. The village of Daya is on the ea
with the river just southward of it, but this river, formerly a
of the Lambesoi, is closed by a sand bank 10 feet high.

Tanjong Po is lower than Daweh point, but may be recogni
a treeless green hill at its extreme, which appears as an island
the offing. There are some rocks above water close off it on
the sea constantly breaks.

Gle Eh Manuk is the southern extreme of Tanjong Po, and is
thence to Lambesoi bay the coast is fronted by a coral bank
maximum distance of half a mile.

LAMBESOI BAY* (lat. 5° 1′ N.), between Lambesoi riv
Karang point, offers but indifferent anchorage, the bottom bein
or rock and the depths irregular; the seaward reefs, nearly 3
off shore, also do not break the sea, and the streams from the
cause a vessel to lie broadside on and therefore to roll heavily
best position is in 7 fathoms, between Palintak reef, which
Lubuk river, and Lambesoi reef to the westward. The Lambesc
are 2 miles in length with depths of 2 to 3 fathoms in places, an
south extreme lies W. by N. about 1½ miles from pulo Lir
Palintak reef has a depth of 2¼ fathoms.

To enter, pulo Limpang should be steered for when bearin
until about one mile from it, or the mouth of the Lambesoi
about N. ½ E., when it should be steered for, anchoring abrea

* *See* plan of Lambesoi bay on No. 2,284.

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little northward of Palintak reef, which with the northernmost Lambesoi reef always breaks.

There is said to be a passage from the northward within Lambesoi reefs, with not less than 6 fathoms, on the line of pulo Limpang in the saddle between the Raja peaks, but this is apparently not borne out by the chart. Gle Karang, the hill close eastward of pulo Rusa, open of Daweh point leads westward of Lambesoi reefs.

The Lambesoi, Lubuk and Unga discharge into the bay, and have villages at their mouths; the first mentioned only is of any importance, and it is the largest on this portion of the coast. It rises in Bukit Mukurah (p. 251), and is navigable for craft of 4 feet draught for about 4 miles. A bank of stones, dry at low water, extends off the western point, rendering it necessary when entering to approach the entrance from the eastward and hug the east point. Four cables S. ½ W. of the mouth of the river is a rock with less than 3 fathoms.

Pulo Limpang, a rocky islet with precipitous sides of red rock, and crowned by thick foliage, is easily recognised; it stands on the reef which surrounds Karang point to the distance of half a mile.

Coast.—Baba Awi bay, (lat. 4° 57′ N.) lies between Subang and Bangka points, which are 7 miles apart. It is open to westerly winds, but affords some protection for small craft from south-west winds off Baba Awi village, in 5 fathoms, mud. The shore is skirted by a reef all round, and there are three reefs in the bay.

Subang reef, half a mile in extent, with a least depth of 2 fathoms, lies about one mile south-west of the low point of the same name, with pulo Limpang N. ¼ E. distant 1¾ miles. Gle Karang, open of Daweh point, leads westward of it, as well as of Lambesoi reefs. The east extreme of pulo Raja in line with Bangka point, leads between the reef and that fronting the shore, in 7 fathoms.

A detached reef lies with its western extreme nearly one mile off Jinamprong, the middle point of the bay, with a passage between it and the reef fronting that point.

Bangka point, the south-west extreme of the bay, is low with a coral reef extending a few hundred yards off it and of the shore eastward and southward of it.

Baba Parot reef is one mile in length, east and west, by half mile in breadth, with a least depth of 2¼ fathoms, from which

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Bangka point bears E. ½ S. distant 1½ miles; it breaks with the swell. There are depths of 14 fathoms between it and the point Baba Nipa point in line with the east extreme of pulo Raja lea the fairway. To pass westward of the reef, keep Gunong (Green hill) open of Daweh point.

Noh point is low, and situated about 2 miles southward of Ba point. The coast between is fronted by a reef with rocks a water; and just beyond, at half a mile off shore, are two others a water on which the sea breaks. Noh village lies eastward o point.

RAJA BAY or TELOK KRUT.—(lat. 4° 52′ N.) This over 1½ miles in extent, lies between Medang hill and pulo and is one of the safest on this coast, with good holding groun 8 to 10 fathoms, but open to the north-westward. With these w vessels can run through Raja strait and anchor under the le pulo Raja. The bay is fronted by a coral reef to a short dist which extends farthest off under Medang hill, with rocks above w on it in places. The Charakman creek discharges southward of hill.

The village of Telok Krut, on the south-east side of the bay, i most important pepper port on the west coast of Sumatra.

Pulo Raja is 1½ miles in length, east and west, by half a in breadth, and thickly wooded, with its summit 330 feet above sea.

A reef surrounds the island to the distance of half a mile o west side, and there are rocks above water on that side and the south side: these are steep-to. Pulo Maneh, 42 feet hig yellow sandstone rock with a wooded summit, is situated on reef at the north-west extreme of the island.

The Dutch station and fort are situated on the east side pulo Raja, in Raja strait, southward of Batu Keramat, the north-w extreme of the island. The graves of the Telok Krut chiefs ar Batu Keramat.

Pier.—There is an iron jetty 60 yards in length abreast Dutch station.

Anchorages.—There is anchorage off the pier in 7 to 9 fathor and there is good holding ground farther northward in 9 fatho

See plan of Raja strait on chart, No. 2,760.

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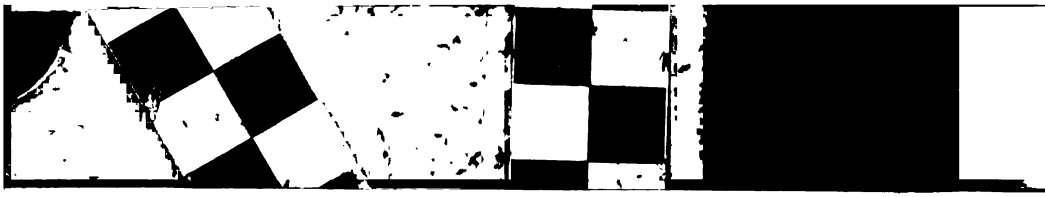

off Lok Siran village, with the east point of pulo Raja S. by E. and pulo Maneh W.S.W. With north-west winds the best anchorage is about half a mile southward of the Dutch station, in about 8 fathoms, under the lee of the island. There is also good anchorage in 10 fathoms between pulo Raja and Baba Nipa point.

Raja strait is about 1½ cables wide by 5 cables in length. Rocks, the north and south of which are nearly awash, lie near the centre of the fairway, the northern one being nearly abreast Telok Krut point, the southernmost being 1½ cables farther southward; a bank extends about 130 yards north-eastward of Keremat, rendering the strait here only about 80 yards wide. There are no other dangers beyond the shore reef on either side which extends but a short distance. The rocks in the fairway are marked on the west side by two black nun buoys, but they are not to be depended on.

To proceed through the strait keep about 100 yards from the island shore, with the little cone hill on the east slope of Tembaga hill in line with Nok point, on which line there is not less than 7 fathoms.

COAST.—Baba Nipa point, 3 miles south-eastward of pulo Raja, may be recognised by its yellow gray precipitous sides and the rock above water close off it. The bottom is foul and irregular off the point, causing heavy rollers during strong winds. Tembaga hill touching the east side of pulo Raja leads seaward of all dangers.

Merak point to the southward of Baba Nipa is low and clear of danger, but there are rocks above water off the coast between; eastward of Merak a reef extends about 2 cables off.

Pati point, 2 miles southward of Merak point, has a long green hill with scattered cocoa-nut trees on it. A reef extends about half a mile off it and of the bight northward, on which is Keheh, or Kechil islet covered with thick foliage, with rocks above water north-west of it. Pati village lies within the point.

PULO KAS is a high, rocky, thickly wooded and desert islet, one mile in length, situated half a mile south-westward of Pati point. Its west side is steep-to, but the east and south sides have a coral reef half a cable wide with 6 fathoms close-to.

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A good position is in 7 fathoms, with the south point of the is bearing S. by W. ½ W. distant about half a mile, and the summ pulo Raja in line with the west slope of the wooded part of Nipah point.

COAST.—Gunong Malin is the hilly coast point 4 miles so eastward of pulo Kas; a reef, steep-to, extends half a mile with rocks above water on it.

Pejaba islets are two rocky desert islets with a few trees encircled by a reef. About 2½ cables south-west of the western is a rock 16 feet high, steep-to on the west side, with others to it. S. by E. distant 3 cables from the Pejabas is a sunken nearly awash, with depths of 11 fathoms around; there are sunken rocks between this rock and the islets.

Pulo Klung, or Plieng, lies eastward of Pejaba islets and 2 ca off the coast abreast Lagen. It is higher than the Pejabas, b 394 feet in height, and is thickly wooded but uninhabited. Ther depths of 10 fathoms between Klung and those islets, and a 3 fathoms between Klung and the coast.

Telok Kelumpang, lies within the point of the same n which is a narrow precipitous tongue of land crowned by a g hill with a few scattered trees on it. A reef extends eastward f the point for 1½ cables, and to a distance of three-quarters of a c off shore. A rock above water lies half a cable south-west of point.

There is temporary anchorage in 6½ fathoms off the vil with the point bearing W. by S.; but the bay being open to w between S.W. and N.W., vessels must be prepared to leave it at moment. There is good anchorage between pulo Klung Kelumpang, in 9 fathoms, sand and mud, with some slight protec from north-west winds. Sailing vessels should moor with o hawse to the north-west. There is not much room to drag here.

The village is an important place for the pepper trade.

The Chikems (Pirling) are two islets situated one mile sou ward of Kelumpang point. The largest and easternmost is high steep, with a coral reef with rocks above water in places, extend 2 cables northward and southward of it. The west islet is steep on its seaward side.

Batu Broh are three bare rocks (about 10 feet high) between

See chart, No. 2,760.

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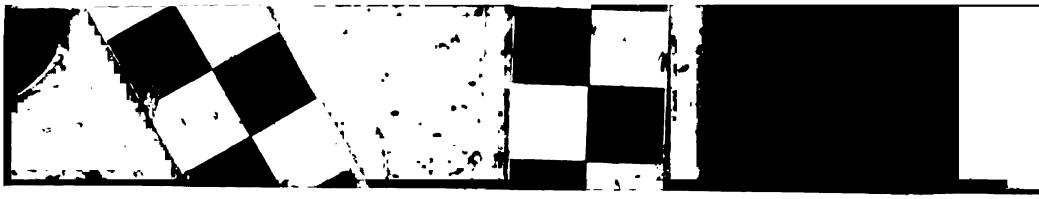

Chikems and the main, with a reef on their eastern side. There is a depth of $3\frac{3}{4}$ fathoms between them and the Chikems.

Pulo Ranoi lies a few yards off Ranoi point; it is a mass of rock 56 feet high, with a wooded summit, and presents a great contrast to the coast, which is low, sandy, and wooded from Kelumpang point to abreast it. A reef fronts the shore between Ranoi and Rigas point to the distance of 3 cables, with rocks above water in places.

Gillis reef, or Karang Angkatan, with a least depth of 11 feet and 10 fathoms around, is about 50 yards in extent and seldom breaks. It lies with the westernmost Chikem in line with the westernmost Pejaba, $1\frac{1}{4}$ miles from the first mentioned.

Baba Nipah point open westward of pulo Kas leads westward of it. Raja hills in line with Kelumpang point leads eastward of it, and Kuali hill in line with Ranoi leads southward of it.

RIGAS approach.*—Rigas point is the south-west extreme of the peninsula within which is Rigas bay; it is a rocky headland rising steeply from the sea, covered with vegetation, and higher than the land within it. Some hill tops near it are thickly wooded, others are green and cultivated.

Rangas island lies about one mile south-westward of Rigas point; it is a small rocky island 59 feet in height and covered with trees which are visible for a considerable distance. A reef with 3 fathoms and less extends about one cable off its north-east side; two rocks above water lie off its south-east side, and a sunken rock, which always breaks, lies close off the north-west side, all of which are steep-to.

There is fine weather anchorage all round the island in about 12 fathoms, and small vessels may find shelter during north-west winds in the same depth, with the north-east extreme of the island bearing W. by N. about one cable.

A rock, 3 feet high, lies E. by S. half a mile from Rangas island.

RIGAS BAY, between Rigas and Chelang points, is about $1\frac{1}{2}$ miles wide, and it is about the same in depth; the coast is for the most part composed of rocky cliffs, excepting the swampy portion on its [illegible] side. The four islands which encumber it divide the bay

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South harbour is the larger of the two, and is used by al small craft, being about half a mile in extent with depths o 6 fathoms, sand and mud, and easy of access. It is open t south-west monsoon rendering it advisable to moor, but the sout bight in it, some 2 cables wide, affords fair shelter even at season.

The north harbour has depths of 3 to 4 fathoms over a bread 1½ cables, and is used by small trading craft; it affords fair sh at all seasons, and being abreast the town of Rigas is much convenient than the south harbour.

Vessels making any stay at Rigas are recommended to between Rasam island and Rasam rocks, where there are dept 9 fathoms over sand and mud; as the harbours are notorious marsh fevers, and the exhalations from the extensive coral flats w partly dry and nearly surround them give rise to an intole stench. The distance from this anchorage to the town is not gr than from the south harbour.

The town of Rigas is one of the principal places for collection and export of pepper. No supplies are obtainable, t being only sufficient for the inhabitants; its drinking water is b

Islands and Dangers.—The four islets in the harbour ar uninhabited. Rasam, the largest, is about 3½ cables in length, n and south, by 1½ cables in breadth; with the exception of the east it is steep, rocky and wooded; on the east side there is a flat por covered with cocoa nut trees. A reef surrounds it to the distanc one to 2 cables, except at its south extreme and a small part of north coast.

Pulo Angang, eastward of Rasam, and Pogase or Pegaseh and Se within it, are low rocky islets covered with trees and brushwo they are all situated within the edge of the irregular coral r with less than 3 fathoms, and dry in places, which fills the in half of the bay.

Three reefs with depth of 2 to 2½ fathoms lie within a quarter mile southward of pulo Rasam. Semut open southward of Ang leads eastward, and Rambung point open westward of Rasam le westward of them.

Rasam rocks, above water, with depths of about 10 fathoms clos lie between Rasam and Rangas, at 6 cables from the former; a patc 2½ fathoms lies 2 cables north-westward of them, also steep-to.

See plan of Rigas bay on chart, No. 2.760.

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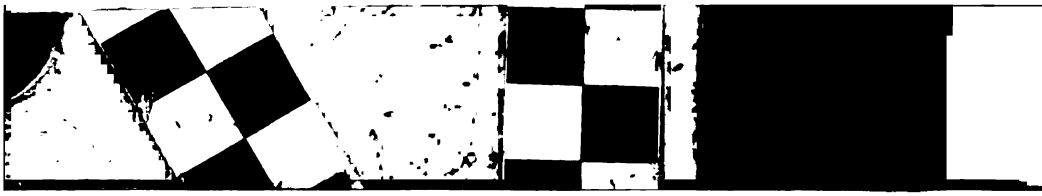

north shore between Rigas and Rambung points is fronted by a reef to the distance of one to 1½ cables, with two off-lying patches. Chelang and Batu Tutung the high and rocky promontories covered with trees, on the southern shore are steep-to; Chelang peninsula is 492 feet in height. The village of Batu Tutung is situated on the point of that name, and that of Chelang in a sandy bay on the east side of the peninsula.

Pasir islets consist of the Pasir Besar group of four rocky islets and the Pasir Kechil of three, situated from one to 1½ miles south-eastward of Chelang point, and half a mile off-shore. Two rocks above water lie 2½ cables south-west of Pasir Besar, the largest islet, and a sunken reef about 3 cables north-north-west of it, with a reef apparently connecting it with that island. A rock above water lies midway between the sunken reef and the south extreme of Chelang point.

Near the Pasir Kechil group is a rock above water, nearly one cable northward of the largest islet; a rock with 8 feet on it 3 cables northward of the same islet; and a reef about 2 cables in extent about a quarter of a mile eastward of that islet; a sunken rock lies about one cable eastward of the point southward of Chelang village. These dangers are all steep-to; others uncharted may, however, exist.

Directions.—Gunong Kwali or Rigas hill, described on p. 251, is one of the most conspicuous landmarks on the west coast, and is visible from a distance of 40 miles in clear weather, and, therefore, a good landmark when approaching Rigas harbour.

To enter the Southern harbour from the northward, it is advisable to pass westward of pulo Rangas at the distance of about half a mile, when course may be shaped southward of Rasam rocks, which are above water, for Chelang point. This point is steep-to and may be passed at about a cable distance, observing that pulo Semut open eastward of Angang leads eastward of the sunken rocks southward of pulo Rasam.

Anchorage may be taken in about 5 fathoms, when Batu Tulung bears S.E., at the distance of 2 cables; during the south-west monsoon period, if advisible, vessels may anchor in the bight within Chelang point.

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To the southward a vessel may haul up for Chelang

Besar, and which may be passed on either side. There is said t
a good channel within the Pasir islets used by coasting vessels.

The Northern harbour is only available for small craft. The cha
between Rasam island north-west reef and the isolated reef off
north shore, is only about one cable wide, and should only be
by those locally acquainted.

The anchorage between Rasam island and Rasam rocks is eas
access, as will be seen by the plan. Vessels should moor in t
anchorages.

Ketapang Pasir bay lies between the mouth of Meri
Mesiri river, on the right bank of which is the village of Ketap
Pasir, and the south-east point of Chelang peninsula.

Johor reef, a coral reef about one cable in diameter, with 4
least water, lies about 6 cables westward of the mouth of the ri
at 2½ cables off shore, with depths of 5 fathoms close-to. Gun
Kuali in line with the east side of Batu Tulung leads clear of it.

The anchorage eastward or westward of this reef, in 5 to 6 fatho
is fairly good even during the south-west monsoon, being somew
sheltered by Pasir islets.

The village may be recognised by the group of cocoa-nut tree
which it stands.

RIGAS BAY to TANJONG RAJA or TEKU.
General remarks.—The coast between Ketapang Pasir, ab
3 miles eastward of Rigas bay, and Tanjong Raja or Teku (cape Fe
a distance of about 77 miles is of an entirely different character to
to the northward. The whole of it is low with a sandy beach
behind it a uniform row of aroe trees, similar in appearance to
pine tree. Near Waila (lat. 4° 18′ N.) there is, or was many y
ago, a wide gap in the trees, covered with brushwood, with a gr
of six trees at the back conspicuously visible through the openi
Southward of this point the trees begin again and continue i
regular line to near Tuba point about 7 miles beyond, where t
cease.

There is an extensive swamp between the Waila and Baban riv
named Raja Demet, which feeds the Laut-Ni lake within it. T
Barisan or Gunong Itam range (p. 248) which runs nearly paralle

* *See* chart, No. 2,760

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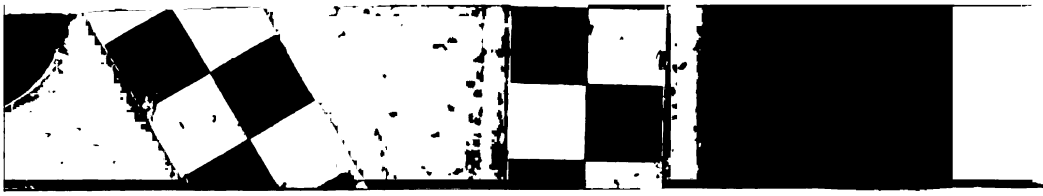

the coast, is about 7 miles inland, or farther than on any other portion of the west coast of Sumatra. It is as devoid of conspicuous points as the coast itself. The coast is wooded with cocoa-nut trees from south of Melabu to the conspicuous wood at the mouth of the Senagan. Southward of this are isolated aroe trees as far as the mouth of the Teripah river. There are some small streams on this coast navigable by small craft within the entrances, but the bars are very shallow and treacherous, and only passable at times by those locally acquainted; there appears to be a lull after every 7 to 9 rollers.

The coast is on the whole free from known dangers and may be approached by the lead, but it is advisable not to approach within a depth of 10 fathoms, as the bottom shoals rapidly within it. The bottom is sand under 7 or 8 fathoms and mud beyond. The only charted dangers are those off Tuba and Melabu, and the doubtful danger off the Teripah.

Mountains (continued from p. 252.) Abong Abong mountain, 11,155 feet high, lies about 33 miles from the coast, north-eastward of Tanjong Raja or Teku; it is a slightly curved dome-shaped summit, only distinguishable from the surrounding mountains by its great height.

Gunong Gredong, south-westward of Abong Abong, and about 22 miles from the coast, is supposed to be the only active volcano in the province of Acheh.

COAST.—Sabil river discharges by two mouths, the Kwala Sawang and Kwala Kalung, at 5 and 6 miles south-eastward of Rigas bay; they are available for boats when the wind and swell are favourable for entering.

Panga river lies 4½ miles south-eastward of the Kalung, with the village of the same name on its left bank. It is not easily identified, but the aroe trees are slightly higher near it than on either side. The Un creek connects the Panga with the Tenom, and is much used for communicating between the two villages.

Tenom river (lat. 4° 28′ N.) is easily identified by the promontory which from a distance looks like an island, situated about one mile southward of it. It is less difficult to enter than the Panga. The

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Waila river.—The Lambalik is an insignificant stream wh has the same mouth as the larger Waila river. The aroe t extending along the coast from the northward, cease near the no bank of the Waila, rendering the mouth of that river ea recognisable from a considerable distance. The depth or navigabi of the Waila is not stated, but it is apparently of no importance.

BUBUN BAY* (lat. 4° 12′ N.) within Tuba point, affords g anchorage in 5 fathoms, sheltered from all winds between W.S through north, and East, within the reefs mentioned below. village of Bubun lies on the west side of the bay, at the head which the river of the same name discharges.

Tuba point, the west extreme of Bubun bay, is a low promont with some peculiar trees resembling mops, but these will not identified when coming from the northward. There is als cocoa-nut grove at the village, which may help to identify it.

Reefs.—A coral reef partly dry at low water, extends 4 ca south-west of Tuba point, and continues along the coast to abr the village, but at a much less distance. Four reefs lie westward the point, with depths of less than 3 fathoms; the outermos 9 cables off shore, the others at about half that distance. Two r lie eastward of the point; the southernmost is 4 cables in length 2 cables in breadth, with a least depth of 2 fathoms and 7 fath around, and its nearest point lies S.E. ¾ E. one mile from the po The northern reef dries, with 7 fathoms around, and lies one m east of the point.

MELABU (Analabu) BAY* (lat. 4° 8′ N.), though of the sa shape and nearly the same extent as Bubun bay, affords far protection, there being no reefs seaward of the anchorage as Bubun bay. The bay is encircled by a reef which extends to distance of half a cable off the western mouth of Melabu ri There is anchorage in about 5 fathoms sand and mud, with the f staff about W. by N., but there are usually rollers setting in render it necessary to be ready to leave it at any moment. The bay unhealthy, rendering it necessary to anchor as far off as possibl avoid the stench of the coral and mud flats.

Karang point, the west extreme of Melabu bay, is a low po covered with cocoa-nut trees, and may further be distinguished

* *See* plan on chart, No. 2,760.

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the buildings of the settlement. A coral reef projects about one cable southward of it.

Five small reefs lie westward of the point; the outer one has a depth of 2 fathoms, and lies W. by N. ½ N. distant 1½ miles; the other four have from 9 to 14 feet and lie nearer the shore; the southernmost with 12 feet lies S.S.W. ½ W. half a mile from the point; they are marked by breakers.

Dutch station.—The Dutch station and military outpost of Melabu is situated on the right bank of the Kwala Jangkul, the western mouth of Melabu river. There is a landing place for boats here, but communication is often rendered impossible on account of the heavy surf. This mouth is deeper than the eastern one and is navigable by boats.

Supplies.—Communication.—Water and small supplies are obtainable and firewood in any quantity. Melabu has a considerable trade in pepper. The Netherlands India steamers call here fortnightly. (*See* p. 8.)

COAST.—Senagan river enters the sea at about 4½ miles south-eastward of Melabu; its mouth is shallow but it is said to be deep within; there is a well defined clump of high trees near its south point, which affords also a good mark for Melabu when approaching from the southward.

Terang river lies 5 miles south-eastward of the Senagan; its mouth is also shallow, and a patch of 5 fathoms is charted 1¼ miles off it. Some trade is carried on by the villages of Telang and Padang, 5 miles beyond the mouth of the Tadu, a similar stream, off which places there is temporary anchorage in 5 to 6 fathoms.

Teripah river has three mouths and is available for boats under favourable circumstances; the northern mouth is known as the Teripah, the middle as Sikandang Jut, and the southernmost as Sikandang Rajut.

A reef with 3 fathoms water and 9 fathoms around, is charted about 3 miles westward of the middle mouth, but it was unsuccessfully searched for by H.N.M. vessel *Palembang* in 1882, and no signs of discolouration or heave were observed, although there was a heavy swell on during the time occupied in the search. It is advisable

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position to keep in depths above

Sanaam stream, 4 miles north-westward of Tanjong R Teku, of no importance, has the village of Kota Pasei on its bank. A reef lies close inshore between its mouth and T Raja.

TANJONG RAJA or TEKU (cape Felix), is a ver and rounded promontory, overgrown with brushwood and d to identify, but it is free from known dangers.

Off-lying reefs.—A coral patch of 4 fathoms lies with T Raja bearing E. by N. ½ N. about 14¼ miles.

A reef of 5½ fathoms, 1½ miles in extent, with very deep around, lies with the point N.E. ⅛ E., distant 13 miles.

A rock with less than 3 fathoms lies with the point N. ½ E. 12¼ miles; it is usually marked by breakers.

A reef, 1½ miles in extent, with 5 fathoms water, lies with T Raja bearing from its north-west extreme N. ¼ W., distant 12¾

Crimea reef, with a depth of 4½ fathoms and 32 fathoms a it, lies with Tanjong Raja bearing N.W. by W. ½ W., distant 12 and 6¼ miles south-westward of Susu Susu. A patch with 7 fathoms lies E.S.E., distant 3½ miles from Crimea reef; a pa 3 fathoms marked occasionally by breakers, lies S. ¾ E., 4½ miles from the Crimea. A patch with less than 3 fat marked by breakers, lies S.W. by S., distant 1¾ miles fro 3-fathoms patch, and one of 5 fathoms the same distance sout of the 3-fathoms patch. A patch of 5 fathoms also lies 4 mil of the 3 fathoms. Other dangers may exist.

COAST.—TANJONG RAJA or TEKU to TANJ PALIKALA.—General remarks.—From Tanjong Raj coast trends eastward for about 14 miles to Susu Susu, whe trends south-eastward for about 60 miles to Tanjong Kama thence forming a bight in which Trumon is situated, it trends ward to Tanjong Palikala, abreast the Banjak islands.

The appearance of this coast varies greatly. Eastward of Ta Raja the shore continues low and sandy, a row of lofty appearing between the outlets of the Lama Tua and Lama Thence the coast is hilly, and between Maki and Terbangan in many places precipitous. A succession of sand dunes e along the coast between the mouths of the Kluat river (lat. 3 and the sandy coast between the Kluat and Tanjong Kamar

See chart, No. 2,760.

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lined with aroe trees. In the neighbourhood of Trumon the land is marshy. There are no streams of any importance. The promontories on this coast render it easy to locate a vessel when within a few miles of the shore; the mountains also after a first visit will no doubt also prove useful in that respect.

Mountains (continued from p. 264).—**Gunong Luzeh**, the highest of the Sinobong range, will easily be recognised by its two very sharp peaks; it lies on about the parallel of Tanjong Raja, at 15 miles from the coast. Bearing about north-east it shows as a saddle. Within 2 or 3 miles of the coast are the following peaks:—

Lok Pauh (lat. 3° 10′ N.) stands somewhat isolated, and may be recognised by its peculiar form, a round hump, which presents the same appearance from nearly all directions. It is the first summit of the coast range, which begins a few miles southward of Susu Susu.

Gunong Manging the next peak southward is a green hill 3 miles within the point of the same name. Kumajau, Kubu, Piatu and Labo Gajah are peaks of the same range, which trends parallel to the coast.

Gunong Maki (lat. 2° 58′ N.) is high; on its north side it looks like a stairway with one step to it; it lies on the south side of rather a wide valley.

Gunong Tuan is easily recognised and is a useful mark when approaching Tampat Tuan. Seen from the southward it shows as a high peak with three lower ones descending like steps to the eastward.

Gunong Terbangan Jut (lat. 3° 12′ N.), and close to the coast, is a very sharp peak with a steep slope to the southward, and is easily recognised.

Gunong Belang Balok, 8 miles to the southward, is 4 miles from the coast at the back of the plain through which the Kluat river discharges; it shows a slight saddle off this river.

Gunong Trumon lies about 13 miles within Trumon, and when bearing east appears as a high flat summit with almost precipitous sides, but bearing north-east it slopes gently on both sides. Kokohan is a round hill midway between it and the coast. *Continued on p. 293.*

Islets and dangers.—Caution.—There are many islets off this [illegible] numerous isolated dangers, many out of sight of land, which

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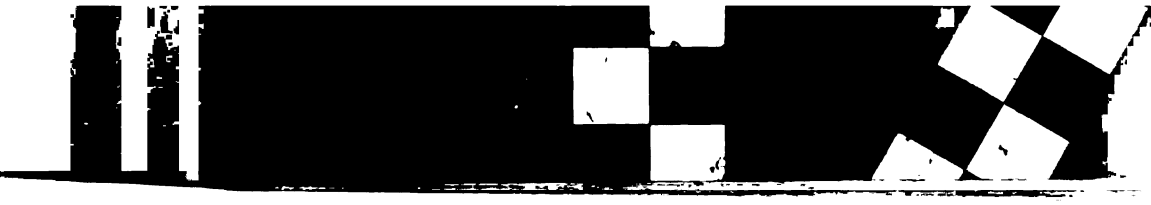

renders navigation along this coast hazardous. Reefs with d
of less than 3 fathoms generally show by breakers or roller
many others are indicated neither by breakers nor by discolou
of the water. Many dangers doubtless exist that are not ch
and also many that do exist are not correctly placed, as the coas
never been properly surveyed. The nature of the bottom ch
completely southward of Tanjong Raja; whereas northward
the depths decrease regularly, vessels come suddenly into conside
and irregular depths southward of it, which depths will be
close to dangerous shoals. The lead, however, should n
neglected, and a good look-out aloft should always be kept d
the day. Night navigation is attended with considerable risk.

Coast.—From Tanjong Raja the coast trends eastward for 11
to Arung point, with several detached reefs with deep water a
them; the two farthest off are the patch with less than 3 fat
situated S.E. by E. $\frac{3}{4}$ E. one mile from the Simanjam mouth,
similar reef S.S.E. one mile from the Surean mouth; both
usually marked by breakers.

KWALA BATU and SUSU SUSU BAY,* situate
spectively 12 and 14 miles eastward of Tanjong Raja, affords
protection during the south-west monsoon period, being shel
from north-west winds, which blow with considerable for
times, but a heavy roll sets into both these anchorages at
times; the latter bay has anchorage space in about 4 fathoms
a quarter of a mile in extent on either side of a shoal situated i
centre of the bay, and it is therefore only available for small ve

Reefs in the approaches.—Arung point, the west ex
of Kwala Batu bay, is a low promontory easily recognised b
long row of lofty aroe trees extending westward from the p
it has depths of 8 to 10 fathoms at one cable off it. Small
shallow reefs lie one mile west and a third of a mile east o
point, from one to 2 cables off shore.

Lama reef, with a least depth of one fathom, is about 4 cab
length; from its centre, Arung point bears N.N.E. $\frac{1}{2}$ E.
$1\frac{9}{10}$ miles. Arung reef, with 3 feet least water, lies between
reef and the point. Berua reef lies three-quarters of a mile n
eastward of Arung reef, with a patch of 2 fathoms between.

Chano Pulo reef, with 2 fathoms water, lies with Arung
bearing North $2\frac{1}{4}$ miles; all these reefs may easily be see

* *See* plan of Kwala Batu and Susu Susu bay on chart, No. 2,760.

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breakers or a heave of the sea over them. Potomac, with 5 fathoms, lies about 9 cables E. by N. of Chano Pulo.

Kaju point is encircled by a reef which extends half a mile southward and about half that distance east and west of it.

Kaju reef, with one fathom, lies three-quarters of a mile S.W. of the point.

Deli rock, with $3\frac{1}{2}$ fathoms, marked by a buoy with a black ball, lies with Seranga point, the east extreme of Susu Susu bay, N.E. by E. $\frac{3}{4}$ E. distant $1\frac{1}{2}$ miles; it was originally charted about 4 cables nearer the point and with a depth of $2\frac{1}{2}$ fathoms.

Patches of $3\frac{3}{4}$ fathoms lie with the point N.E. $\frac{1}{2}$ N. about $1\frac{2}{10}$ miles and $1\frac{1}{2}$ miles; a patch of $4\frac{1}{2}$ fathoms lies between them. Patches of $4\frac{3}{4}$ and $4\frac{1}{2}$ fathoms lie at the distances of 3 and 5 cables respectively, from the westernmost $3\frac{3}{4}$ fathoms patch. Deli rock and those above following it have been fixed by H.N.M. vessel *Benkulen*, in 1895.

A patch of $2\frac{1}{2}$ fathoms is charted with Seranga point N.E. by N., 6 cables; San Kalan, which dries, lies three-quarters of a mile south-eastward of it. A reef with 3 fathoms lies with Seranga point N. by W. about $2\frac{3}{4}$ miles. Other reefs are charted between this reef and the reefs found by the *Benkulen*, but it is probable they are identical with those fixed by that vessel.

Seranga point is surrounded by a reef to the distance of a quarter of a mile; it has several cocoa-nut tree stumps standing on it, a considerable portion of the point having been submerged by the earthquake of 16th February, 1861. In the centre of Susu Susu bay there is a patch of one fathom, with depths of 10 fathoms around.

Anchorages.—Kwala Batu affords anchorage in 17 to 20 fathoms, mud, at about one-third of a mile south of the mouth of Kwala Batu creek. The village lies westward of the mouth. Outside Susu Susu bay there is anchorage in 15 fathoms, mud, with Seranga point E. by N., and Kaju point N.W. $\frac{3}{4}$ N. Small craft will find better shelter in the bay, off Susu Susu village in about 4 fathoms, but there is a heavy roll on at times, even there, during the southwest monsoon period.

Directions.—From the northward from abreast Tanjong Raja, distant from 4 to 5 miles, steer parallel to the coast at that distance to pass between Crimea and Chano Pulo reefs. The group of trees on Kaju point will first come in sight, then a similar group on

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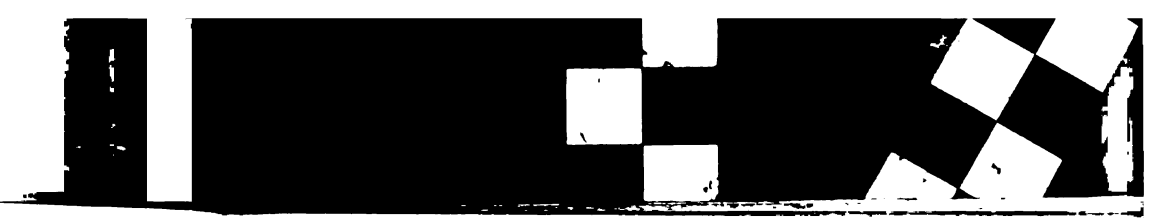
Susu bay on chart, No. 2,760.



Seranga point, and also the village of Batu and the zinc-house on it. The trees on Seranga, when bearing N.E. ¼ E., s be steered for ; thence if bound to Kwala Batu anchorage, whe village bears from North to N. ½ W., steer for it, anchori from 17 to 19 fathoms, mud, within half a mile of it, with point S.E. by E. ¾ E.

If bound to Susu Susu anchorage, continue on with S point trees, N.E. ¼ E., until Kaju point trees bear North, wh vessel will be within Deli rock and may steer midway be Kaju and Seranga points, anchoring in 15 fathoms, mud, wh latter bears E. by N.

Small craft can enter the bay and anchor off Susu Susu as above stated, avoiding the reef which extends 2 cables o point, and the patch of one fathom situated in the centre of th

Caution.—The Deli rock and reefs near it seldom brea they are steep-to, requiring considerable caution when enterin there is no discolouration of the water by which they might b The Kaju, Chano Pulo Lama, Arung and Berua usually break.

Villages.—Kampong Batu lies on the west side of the mo the Batu stream, as before stated. A zinc-roofed house near good landmark. Susu Susu village lies in the south-east cor the bay of that name, and the stream near it and also the Ba navigable by boats only. The natives are not to be trusted.

Communication.—Mail steamer calls fortnightly. (*See* p.

COAST.—From Susu Susu bay the coast trends south-eas for about 7 miles to Pauh North, fronted by the shoals mentio the approach to Susu Susu, for the first 3 miles.

Pauh North is a low and steep promontory covered wit trees, and may be identified by Lok Pauh North, a hill about 2 northward of it. A reef projects half a cable off the point.

Reefs.—There are four reefs in the vicinity of Pauh North depths of less than 3 fathoms and within the distance of 3 miles. lie respectively 1¼ miles N.W. ¾ N. of the point ; 2½ miles N.W. half a mile W. ¼ N. ; and 2¼ miles S.S.W. of the point, all surrounded by deep water ; the last-mentioned is about 2 off Manging, has 2 fathoms water, and there is usually a heave

See chart, No. 2,760.

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Manging point is low and rounded, with the village of Manging on the left bank of the river of the same name. There is good holding ground in 8 to 9 fathoms off it, and also off Pauh Baru, a small village 3¾ miles south-eastward. A reef with less than 3 fathoms lies near the shore at 1¼ miles north-westward of Pauh Baru.

Labuan Haji is a small bay open to the southward and surrounded by rather high land. The village of the same name lies on its west side, and its tall cocoa-nut trees are visible from a considerable distance in the offing. The village of Pulu Car lies westward, and that of Bakau at the mouth of a stream to the eastward of it.

There is anchorage between two reefs about one mile apart, with Labuan Haji village bearing N. by E. ¾ E., Pulu Car village N. ¾ W., and Manging point N.W. by W. ¼ W., in about 15 fathoms, but there is considerable swell here. The bay northward of the line of the west point bearing W.N.W. is foul.

Reefs.—A reef with less than 3 fathoms, lies with Labuan Haji point E. by S. distant 3 miles, at about half a mile off shore; a similar reef lies with the point N.E. by E. ¾ E. 2½ miles; a reef with one fathom lies with the point E. by N. ¾ N., 7 cables; a similar patch with the point N.N.E. ¼ E., one mile; a patch with less than 3 fathoms with the point N. ¾ W., 1¼ miles; a patch of 2½ fathoms with the point N. by W. 7 cables. Gosong, a bank of sand and coral, dries, and lies with the point N.N.W., 1⅛ miles. A rock with less than 3 fathoms, with the point N.N.W. ¾ W., 1¼ miles, 2 cables off shore. A rock with less than 3 fathoms, lies with the point N.N.W. ½ W. distant 6 cables.

A reef with less than 3 fathoms lies with the point southward of Kemumu bearing N.N.W. ¾ W., 1½ miles, at 7 cables off shore. With' the exception of the last three mentioned, the reefs will generally be observed by the sea breaking over them.

Pulu Mal.—Reefs.—Pulu Mal is a small village on the coast at about 2 miles northward of Maki; westward of it within 4½ miles of the coast are the following reefs:—

A coral reef with less than 3 fathoms lies with Labuan Haji point N. by E. ½ E., and Maki point E. by S. ¼ S., 5 miles. A sunken reef

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A rock with less than 3 fathoms, lies 1½ miles off the coast west of Pulu Mal; these reefs are usually visible by the sea breaking them.

MAKI BAY* (lat. 3° 26′ N.) lies between Maki point Batu Tonga and is open to south and south-west winds, so that is generally a heavy roll in it; the coast is hilly. The villa Maki is situated in the northern head, and that of Labuan Tar the southern. Maki point is low and covered with cocoa-nut with Maki village within it; a reef extends about one cable o point. Gunong Maki, the high hill within, is mentioned on p.

Vessels must not anchor in less than 17 fathoms, where holding ground is good; nearer the shore it is sand or cora good position in that depth, sand and mud, is with Batu Ton S.S.E. ¼ E. and Labuan Tarab village E. ¾ S. There is anch also in the same depth within Gar Bua shoal, three-quarte a mile southward of Maki village.

Reefs.—A reef with 4 fathoms and steep-to lies with point bearing N.E., distant 2 miles. Gar Bua, a patch of 3 fath with depths of 22 fathoms at a short distance, lies on the west si the anchorage, with Maki point N.N.E. ¼ E., about 6 cables. Nee, with 2 fathoms, lies with Maki point N. by E. and Tongkah E. by N. ¼ N.

In the offing, westward of Maki are the following reefs :—

A bank of 6 fathoms lies with Gunong Maki bearing E. distant 13½ miles, and 4 miles from the coast. A patch of 4 fat with Maki point E. ¼ S., distant 8½ miles. A patch of 3 fathoms Maki point E. ¼ N., distant 11¾ miles. About half a mile S and W.N.W. of this patch are two shallow heads which brea times. A rock, with less than 3 fathoms, which occasionally br lies with Serundung islet bearing E. ¼ N., about 12 miles.

A bank of 5 fathoms lies with Serundung islet E. ¾ N., 4¼ n and another with same depth with the islet E. ¼ N., about 15 n A patch of 3 fathoms lies with the islet N. by E. one mile.

Directions.—On account of the reefs above-mentioned, Ma somewhat difficult of approach, coming either from northwa southward. The coast should be kept at a distance of 4 or 5 n and when Serundung, the small islet near the coast is distingui

* *See* plan of Maki on chart, No. 2,760.

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course should be shaped to bring it between the bearings of E. by N. and N.E.; then steer for it until Maki point bears N. by W., or the islet is about one mile distant, when Maki point should be steered for, anchoring in one of the positions before mentioned.

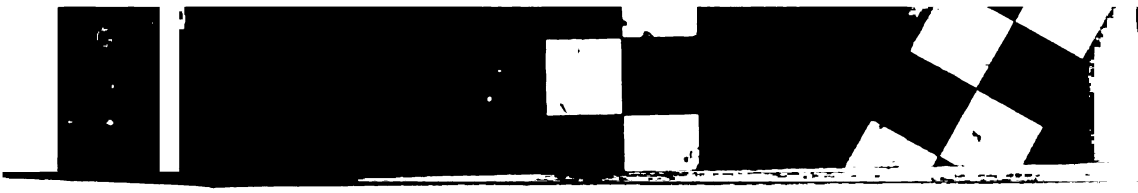
COAST.—Lok Pauh South lies within the point of the same name, at 6½ miles south-eastward of Maki; it is open to southerly winds, but affords temporary anchorage in 17 fathoms, with the point bearing N. by E. about half a mile; the bottom is not good holding ground in less depths. The villages of Alur Paku, Tring Medum, and Sawang Sekuda are situated on the coast between Serundung islet and the somewhat isolated hill named Lok Pauh South, mentioned on p. 268.

Reefs.—A reef with less than 3 fathoms, lies with Pauh South point bearing E. by N. ¼ N., 5½ cables; a reef with 4 fathoms with the point N. by E. 3 cables; and one of 3 fathoms with the point N.N.E. ½ E., 1¾ miles. The two shallowest are generally visible from the roll of the sea over them. A patch of 5 fathoms lies with the point E. ⅝ N., 4¾ miles. The fishermen report a patch of 11 feet as being situated about one mile west of this position; they are probably identical, and should be given a wide berth; it probably breaks.

Batu Belajár is a white rock situated a quarter of a mile off shore, at 2 miles south-eastward of Lok Pauh South; it is said to be a good landmark. The village of Sama Dua lies about one mile southward of it. The depths are considerable near the coast, but patches may possibly exist.

TAMPAT TUAN BAY* (lat. 3° 15′ N.).—This bay, open to southerly winds, and situated between Tuan and Batu Itam points, is rather more than one mile wide in an east and west direction, and divided by Rokban point. The western part is encumbered by Gusong Puka, but the eastern within Gusong Gulu is clear.

There is anchorage in about 20 fathoms, mud, south-eastward of Gusong Puka, about 2½ cables southward of Rokban point; in less depths the bottom is foul, but there is possibly anchorage for small craft off Tampat Tuan village northward of Gusong Puka. The shore of the bay is high and steep, consisting of wooded rocks and high [illegible] reef in most places, but abreast Tampat Tuan



there is a narrow channel through it, affording access to a good lan for boats. Supplies are scarce. Telok Bengkuang is the nam the eastern portion of the bay, in which is the village of the s name.

There is no great difficulty in approaching the anchorage as reefs are usually visible by the breakers over them. Gunong T (p. 268) is a useful mark.

Communication.—Mail steamer calls fortnightly. (*See* p. 8

Reefs.—Batu Tongkat, a small rock about 2 feet high, with de of 15 to 30 fathoms around, lies with Tuan point bearing E. distant nearly one mile; Batavia rock, a patch of 3 fathoms, N. by W. ¾ W. 3 cables, and one with possibly less depth S.W. 1½ miles from it.

Batu Kuseah, awash, lies two cables south-westward of Tuan p and always breaks.

Gusong Puka, a reef with a least depth of 1½ fathoms, 4 fat between it and the shore reef, and steep-to on its south side, li the centre of the west bay of Tampat Tuan.

Gusong Gulu, with a depth of 2 fathoms, and 19 fathoms clo on its seaward sides, lies 1½ cables south-westward of Batu Meral usually breaks. Batu Itam are two rocks above water, close off point of same name, with a depth of 4 fathoms close-to.

Off-lying reefs.—A patch of 4 fathoms lies with Batu Be bearing E. by S., distant 6¼ miles, and another with same d with that rock N.E. by E. ½ E. the same distance. A patc 4 fathoms lies with Tuan point E ¼ N., distant 4¾ miles; a p of 6¾ fathoms lies S.W. ¾ S., 2 miles from the 4 fathoms patch, one of 3 fathoms, distant 4 miles on the same bearing; these have deep water around them. A patch of 1½ fathoms lies 3½ m south-eastward of the last mentioned, with Tuan point N.E. ¼ distant 7½ miles.

COAST.—Lok Rukam is the bight eastward of a steep and r point of the same name and which has a depth of 9 fathoms clo The villages of Rukam and Ayer Penang are situated on the sandy s of the bay, off which there is anchorage in 7 to 8 fathoms. Bet Lok Rukam and the mouths of the Kluat are the villages of R and Asahan; there are no charted dangers within 2 miles of the s

See chart, No. 2,760.

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though some may exist; a patch of 5 fathoms lies with Kwala Bak Ur, the northern mouth of Kluat river, bearing S.E. by E. ½ E., distant 3¾ miles.

Reefs.—In the offing, a patch of 1½ fathoms lies with Kwala Bak Ur bearing E. ¾ N., distant 9 miles, and one with less than three fathoms, with Kwala Bak Ur bearing N.E. by E. ½ E., 13¾ miles; these are usually marked by breakers.

Kluat river.—This river rises in the Sinobong mountains, runs parallel to the coast for the greater part of its course, and discharges by two mouths about 3 miles apart; these can only be entered by native boats by watching the surf until a favourable opportunity occurs. A range of sand hills forms the coast between the mouths, and a sand bank extends one mile seaward, which may be approached by the lead to a depth of 7 fathoms. The northern mouth is named Bak Ur, and has the somewhat large villages of Kedei Acheh and Kedei Melaju on either side of the entrance. Toca, the southern mouth, has no village, but that of Lembong is situated at the mouth of the stream of same name, one mile further southward.

Landmark.—The sand hills between the mouths of this river form an important landmark, and the plain behind extends farther back than on any other portion of this coast (p. 248); Kinja and Belang Balok hills lie within the plain.

Kamarang and Manker are the names applied to the low and rounded promontory situated about 6 miles southward of Kluat river, whence the coast trends eastward to Bakongan; it is fronted by a sandy beach to the distance of 3 cables. As before stated, landing is difficult on this coast even in native boats.

Pulo Manker is a low sand islet surrounded by a coral reef, the whole being about 4 cables in diameter; it formerly had a few trees on it, but these have disappeared. It lies about one mile from the coast; the passage between has depths of 6½ fathoms, and is generally used by vessels from the northward when proceeding to Bakongan bay.

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...sandbank just above water, surrounded

A reef, with less than 3 fathoms, lies with pulo Manker bea
E. by N. ¾ N., about 6 miles.

Southward of pulo Manker are the following reefs, all i
general south-west direction from pulo Dua :—A reef, with less t
3 fathoms, lies with that islet bearing N.E. ½ N. about 3½ mile
reef with about same depth, with the islet N.E. ⅛ N. about 6½ mi
two reefs lying close together on the latter bearing, distant 8½ mi
and a reef with less than 5 fathoms, with the islet N.E. ⅜ E. a
12 miles.

Princess Amelia reefs, three patches usually marked by
or discoloured water, are steep-to, and lie with pulo Manker bea
E.N.E., 30 miles ; N.E. by E. ⅛ E., 24 miles ; and N.E. by E., 22 m
A good look-out aloft should be kept when navigating off all
coast, as before stated.

Bakongan bay (lat. 2° 55′ N.) is a slight indentation on the
between Manker point and Pulu point, about 5½ miles apart
affords shelter from north-west winds, with good anchorage in
15 fathoms, mud, off Bakongan village. Coming from the n
ward pass between pulo Mangker and the shore, and coast a
within the distance of 4 cables ; from the southward pass bet
Dua and Kaju islands, thence to the anchorage off the village.

Reefs.—The following reefs lie in the approach to the an
age :—

A one-fathom patch lies, with Bakongan village N.N.E.
one mile ; a one-fathom patch with the village N. by E.
$1\frac{1}{10}$ miles, and a reef with 2 fathoms with the village N. ¾
distant 3 miles. A reef with not less than 3 fathoms lies bet
pulo Dua and pulo Ara, and a similar reef 5½ cables S.S.E. ¾
pulo Kaju.

Pulo Dua and pulo Kaju are low sand islets covered
vegetation ; there are a few inhabitants on each, engaged ir
cultivation of cocoa-nuts. The summits of the trees render the
conspicuous. The islets are each surrounded by a coral reef an
channel between them is one cable wide with a depth of 10 fat
in the fairway ; the reefs are sharply defined by surf and disco
ation which render the passage easy of navigation. On the
abreast lies the village of Dua, with anchorage in 12 fat
abreast it.

See chart, No. 2,760.

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Pulo Ara is a sandbank just above water, situated nearly one mile south-west of pulo Kaju.

Sibadi is a village in the bight 2 miles eastward of pulo Dua, between the two low points of Dasalim and Sedekat. There is good anchorage at about half a mile off shore in from 6 to 10 fathoms. Both points of the bay have reefs around them to a short distance.

Silekat or Sedekat village is situated in the bight eastward of Sedekat point, whence the coast trends south to Trumon. A patch of 10 feet lies about one mile from the point and also from the village; about half a mile S.S.E. of this patch is one with 2 feet water. A reef about half a mile in extent, with 1½ fathoms over it, lies with pulo Trumon bearing S.S.E., distant 3 miles; the sea usually breaks over these.

TRUMON.*—Pulo Trumon (lat. 2° 48′ N.) is a very low islet overgrown with brushwood and having a few cocoa-nut trees, which renders it visible when some miles distant; a reef from 50 to 100 yards wide encircles it. The islet is about 2 miles distant from Trumon village on the shore abreast.

Trumon has a considerable trade in pepper. The coastal mail steamer calls here fortnightly. (*See* p. 8.) The river is only navigable by native boats, and there is usually a heavy surf on the bar and along the coast.

Anchorage.—Directions.—The anchorage off the village is not safe during north-west to south-west winds; light craft seek protection from these under the lee of the islet, in about 6 fathoms. Coming from the northward, the islet may be approached when bearing about E.S.E., passing northward of it at a prudent distance; a spit extends half a cable off its north end. Trumon peak, in clear weather, and Kokohan peak (p. 268), are good marks from the offing.

From the southward, keep close along shore, within the shoals extending about 5 miles southward of pulo Trumon, having avoided the charted off-lying dangers. The lead is a good guide, and depths of 5 to 6 fathoms should be maintained.

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Reefs.—The following reefs lie in the vicinity of pulo Trumon,

A reef with less than 3 fathoms, one mile West ; a reef with
than 3 fathoms, 1½ miles W. by S. ¾ S. ; discoloured water 5 m
W. by S. ¼ S. ; a reef with 9 fathoms, 1½ miles S.S.W. ¾ W. ; a
with less than 3 fathoms and half a mile in extent, 2½ miles S. ½
a reef with 9 fathoms, 4 miles S. ⅓ E., with pulo Trumon in
with mount Telekat ; a reef with less than 2 fathoms, one
S. by E. ¼ E. ; a reef with less than 3 fathoms, 5½ miles S. by
with pulo Trumon in line with mount Pintorimba ; and a reef
4 fathoms, one mile S.E. ¾ S. of pulo Trumon. Discoloured wate
charted S. by W. ½ W., 6½ miles from pulo Trumon. These r
are steep-to, and the shallower ones occasionally break.

Coast.—Heria reef, with less than 3 fathoms and deep wa
around it, lies about 6 miles off shore, with pulo Trumon bear
N. ⅝ E., distant 10¾ miles.

Bula Sama reef, with less than 3 fathoms, lies with Bula Sa
river entrance bearing E. ¼ N. about 2½ miles.

Ambonia reef, with 2½ fathoms, lies with pulo Jawi J
bearing S.S.W. ½ W. about 6½ miles.

A reef with less than 3 fathoms lies one mile northward of
mouth of Ajer Itam, at about 5 cables off shore.

A reef, seen to break, was reported in 1894, at about 21 m
westward of Bula Sama, in lat. 2° 36′ N., long. 97° 17′ E. appr
A depth of 10 fathoms, hard bottom, was obtained in lat. 2° 34′
long. 96° 45′ E. The Princess Amelia reefs, northward of these,
referred to on p. 277.

BANJAK ISLANDS* are a cluster of islands extending ab
40 miles westward of Singkel. The three largest are pulo Tunang
Bangkaru, and Ujong Batu. There are many islets with deep wa
channels interspersed with rocks, between them.

Pulo Bangkaru, the outer and south-westernmost islet, ha
shoal lying nearly one mile off its west side. Cameleon bay, on
south-east side affords shelter from N.W. winds.

Between pulo Bangkaru and pulo Tapak, 24 miles to the westwa
the channel is considered to be free from danger ; but it
recommended to keep to the Bangkaru side.

See chart, No. 2,760.

* *See* plan of Banjak islands and adjacent coast. No. 855.

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The channel between pulo Bangkaru and Tunangku is nearly 5 miles wide with deep water, there being no danger apparently beyond half a mile from either island.

Pulo Tunangku, the largest island, is nearly 20 miles in length, with a conspicuous sugar loaf peak named Gunong Trusa on its northern end. Close westward of this peak is a bay which affords shelter from southerly winds in from 6 to 13 fathoms, the entrance to which is between pulo Mandang Kattik, and Gunong Batu Lanteh, the west point of the bay. A shoal with 7 fathoms water lies with pulo Timbarat bearing E. by N. $\frac{3}{4}$ N. distant about 3 miles; others may exist near it.

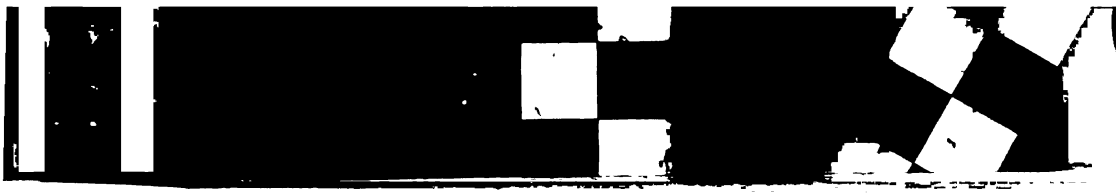
Numerous islets and reefs extend about 6 miles north-eastward of the northern portion of pulo Tunangku, between which and pulo Ujong Batu is a deep channel about 3 miles in width.

Pulo Ujong Batu lies nearly 9 miles north-eastward of Tunangku. It is about 5 miles in length, with islets extending about the same distance southward, between which and Great pulo Balambak there is the deep channel above referred to.

Eastward of the reefs extending about 2 miles north-eastward of pulo Ujong Batu, is a channel nearly 4 miles wide, said to be one of the best passages between the Banjaks, but there are two shallow heads charted in the fairway and two others of which the positions are doubtful. *See* directions for Outer channels, p. 281.

Jawi Jawi or Passage island, the north-eastward of the Banjak islands, lies 10 miles eastward of pulo Ujong Batu, and 7 miles westward of Tanjong Palikala on the main. It is low and sandy with a few shrubs, but there is or was one large banian tree, visible from a distance of about 12 miles. Jawi Jawi is situated on the east end of a reef which is 5 miles in length in an east and west direction, and 3 miles in breadth. There is a deep channel between it and the shoals fronting the main, with a patch of $4\frac{1}{2}$ fathoms in the northern approach; for which see the plan.

DIRECTIONS.—Vessels from the northward bound to any of the ports north of the equator should proceed by one of the passages between Banjak islands and the main. That close along the coast



Jawi Jawi or Passage island channel.—In steering this channel keep about 9 or 10 miles off the coast until pulo J Jawi is seen, then steer towards it, observing never to bring it r easterly than S.E., to avoid getting near the shoals and irreg depths, extending about 5 miles to the westward of it.

Having approached Passage island within 3 miles, bring it to S.S.E., which will lead westward of the 4½ fathom patch, and w three-quarters or half a mile off the island, alter course to pass a that distance eastward of it, to avoid the shoals midway betw it and Tanjong Palikala. The encircling reef of Passage islan dry all round to the distance of a cable at low water, and pro about a quarter of a mile, or rather more in some places, bu not visible at high water. By preserving the distance menti the depths will be tolerably regular, and never less than 1 12 fathoms, mostly rocky bottom.

A good look-out from the masthead is requisite when pas through this channel, as the coral shoals may be discerned in weather, but the flat surrounding Jawi Jawi cannot alway distinguished. When through the channel, which is about 2 r in length, the island must be kept between the bearings of N.I and N.W. by N., astern, as within these bearings a vessel anchor if the wind or tide be unfavourable; but northward o island do not anchor under 20 fathoms, for the ground there is r under that depth.

Inshore channel.—Within 2 miles of the mainland in vicinity of Tanjong Palikala there are several shoals, having 2 to 3 fathoms over them, with a channel of 8 to 9 fathoms bet them and the Sumatra shore. A vessel may venture within l mile of the shore in some places; Palikala has a depth of 7 to 8 fat at one cable distance. The shoals on the western side of channel occasionally break.

Outer channels.—There is a channel nearly 4 miles wide. depths of 17 to 30 fathoms, between pulo Jawi Jawi reef and Ujong Batu. In approaching from the northward, bring littl Balambak to bear S. ½ E.; which bearing being preserved wil through in deep water. A good look-out should be kept fro masthead for uncharted dangers.

The channel between pulo Ujong Batu and pulo Kassik, a easy of navigation, though the chart of the Netherlands Gover

See plan of Banjak islands and adjacent coast, No. 855.

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Survey of 1876 does not show soundings in its northern approach. From the northward, pulo Kassik may be approached bearing S. by E., and when within 2 miles of it, course should be altered to pass one mile westward and southward of pulo Rongit; when the latter bears N. ½ E., steer E. ½ N., keeping Gunong Trusa open northward of the two islets situated on the north-west part of the flat extending from pulo Balambak. (*See* view on plan). When little pulo Balambak bears S. by W., course may be altered to the south-eastward.

SINGKEL.—The town of Singkel, situated eastward of Banjak islands, was formerly a place of considerable trade, the principal exports being benzoin, camphor, wax, and gold. It stands on an island within the mouth of the river, nearly encircled by a low and narrow peninsula, forming its right bank.

One vessel only apparently traded here in 1894; from British India.

Mails and Telegraph.—Mails fortnightly; telegraph by land lines to other ports. (*See* pp. 8 and 9.)

Shoals.—Egmond shoal of 5 fathoms, lies W. by S. ¾ S. distant 4 miles from the conspicuous tree on the low land north-westward of Singkel. Daphne rock lies S. by E. ¾ E. distant 4 miles from the same tree, and 2 miles off shore. Singkel spit, a long sandbank stretching about 4 miles south-eastward from Singkel, is said to be extending and dangerous to approach, and should therefore be given a wide berth.

Directions.—Outer anchorage.—A vessel bound to Singkel from the northward, should, when southward of pulo Jawi Jawi, bring it to bear about N.W. by N., astern, which leads about 3 miles westward of Singkel spit; and having brought the large tree on the low neck of land north-westward of the town to bear N.E., course may be shaped to pass between Daphne rock and the spit, anchoring in from 12 to 13 fathoms, with the mouth of the river N.E., distant one mile.

Singkel road is a bight formed between the south point of the peninsula and the mainland. It is about 1½ miles in breadth with depths apparently of 5 to 8 fathoms, and only open to winds between south and south-east.

Reefs which break project a short distance from the entrance

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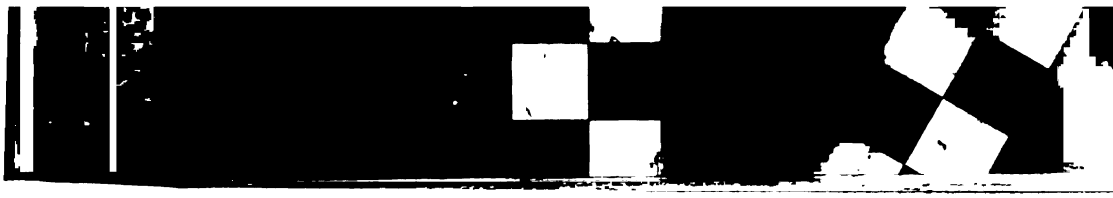

Si Muara Gosong Telaga bay, situated about 9 miles east of Singkel, was formerly sometimes chosen by vessels trading to Sin on account of its shelter. In approaching from the westward, U Bawang, the west point of the bay, should be passed at about 3 r distant, in 8 or 9 fathoms, hard bottom, to avoid the flat which ext nearly 2 miles off it. Eastward of the point the bottom becomes when course should be altered to N.N.E. to pass westward of Kassi, a low sandy island, and anchor between it and the we shore. If the vessel intends remaining a considerable time should anchor in 5 fathoms, mud, on the west side of the small is of Si Maura, which is covered with trees; here she will be shel by the land from westerly winds, and by the reefs at the entran the bay from south-east winds.

Pulo Lakotta, situated 30 miles south-eastward from Sin is a small low island, covered with trees. A reef with a d of 4 fathoms lies with the centre of pulo Lakotta bearing E. distant one mile; also a reef of 4¾ fathoms lies with the same about N.E. distant 6 miles.

Pulo Burong, a low islet or sand bank, situated 5 miles north of Lakotta, is surrounded by a reef which is three-quarters of a in length in an east and west direction.

Shoals.—A one fathom patch lies with pulo Lakotta be S.S.E. ½ E., distant 2 miles; and nearly midway between pulo Bu and Singkel is another shallow patch; a patch which breaks is sit 4 miles N.W. ¼ W. of pulo Burong. There are other charted da some 8 or 10 miles eastward and southward of the islets menti A patch of 4¼ fathoms, reported in 1895, is said to exist with Lakotta bearing S. 72 W., distant about 7 miles.

The best track for vessels is apparently midway betwee Lakotta and the main land, where depths of 25 fathoms are ch but a vessel must be navigated from aloft. The space to the and south-west of pulo Lakotta is unsurveyed. The coast be Si Maura Gusong and Baros is encumbered by shoals, which ir parts extend 10 miles off shore.

TAPUS ROAD* lies about 5 miles westward of Baros, men below; it is open to the southward and affords anchorage in 5 to 6 fathoms at about one mile south-westward of the fl

* *See* plan of Tapus road on No. 855, and chart, No. 2,760.

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situated at the mouth of the river. A triangular shoal about 3 cables in length, with depths of 2 fathoms or less, lies on the east side of the road at one mile south of the flagstaff.*

Wood and water may be obtained here.

BAROS,* an open port, in lat. 2° 2′ N., is a place of some trade. The principal exports are camphor and benzoin; fresh water may be procured, but it is imprudent for a boat to enter the river without a native guide. (*See* caution regarding Natives, p. 8.)

A shoal extends about one mile in a S.S.W. direction from the east point of the river, on which the town of Baros stands.

Mails.—Fortnightly. (*See* p. 8.)

Directions.—A vessel bound from Singkel to Baros should steer to pass about 5 miles within pulo Burong in the track above mentioned. Pass southward of pulo Karang, a small island covered with trees, at about a mile distant, and anchor in Baros road in about 8 fathoms, mud, with the flagstaff bearing N.N.E., and pulo Karang, West about 2 miles.

TAPANULI (Siboga) BAY,† between Tanjong Batu Buro and Tanjong Mama, its entrance points, is 9 miles wide. Tanjong Batu Buro, the northern point, is of considerable height. Pulo Nassie Satunkus, or Sugar Loaf, a conical-shaped islet, lying off Tanjong Mama, is a conspicuous object when approaching or leaving Tapanuli bay by the southern channel.

The northern channel between pulo Mansalar and the main, leading to Tapanuli bay, is 7 miles wide, with depths of from 12 to 18 fathoms, on either side of Banda shoal.

The southern channel, between pulo Mansalar group and pulo Nassie Satunkus, is free from danger, with regular depths of about 24 fathoms.

The west side of pulo Nassie Satunkus is clear of danger, but rocks extend about one cable eastward of it.

Shoals.—Bordering the northern channel, at about 6 miles southward of pulo Sorkam, and 1½ miles off shore, is Karang Gadang, with a depth of 9 feet. Argo shoal lies one mile off Tanjong Pandang, and has from 9 to 10 fathoms close to. A rock with 2½ fathoms lies

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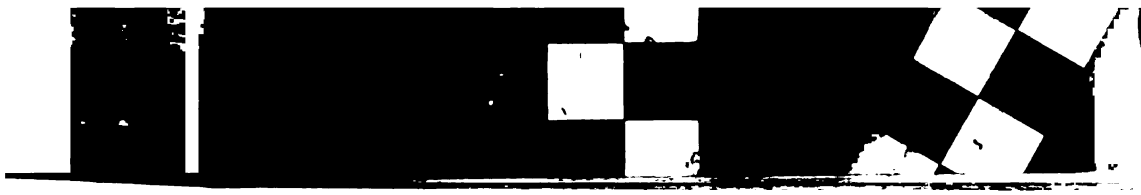

about 3 cables off the west extreme of Tanjong Batu Baro, a entrance to Tapanuli harbour. Banda shoal of 5 fathoms, ste lies in the fairway of the northern channel.

Tapanuli harbour* is an extensive inlet on the north si Tapanuli bay; it is subdivided into many coves by islands, a large number of vessels may lie sheltered from all winds. I outer portion, eastward of Ponchang Gedang and Ponchang K there are depths of 7 to 8 fathoms for about 2 miles in length b in breadth, and there is also good anchorage in 6 to 8 fathoms ward of Ponchang Kechil. The inner harbour, about one square, affords depths of 2 to 3 fathoms, with from 3 to 4 fatho the narrow approach to it.

It is an open port, and the seat of the Dutch resident for th trict, but it has little commerce; the natives around are barb and the country a mere forest.

Islets.—Ponchang Gedang, the largest islet, lies betwee entrance points of the harbour, near the eastern shore. It has steep hills covered with large timber, and near the foot of these are several springs of fresh water. The island is encircled by with some isolated rocks about 2 cables off its eastern side.

Pulo Ponchang Kechil lies nearly one mile north-westward o Ponchang, with depths of 10 fathoms between. Pulo Panjar northward of pulo Ponchang Kechil, with depths of 8 fathoms channel between. The north end of pulo Panjang is nearly nected to the shore by reefs.

Tides.—It is high water, full and change, at Tapanuli at 6 h springs rise about 6 feet.

Directions.—Tapanuli bay and harbour may be safely appro by passing on either side of pulo Mansular group, thence wes of pulo Ponchang Gedang, and on either side of pulo Pon Kechil according to circumstances; anchorage may be taken i 8 fathoms, soft bottom, between that islet and Siboga, or in the positions previously mentioned.

Towns.—The town of Tapanuli is at the northern head harbour.

Siboga, the Dutch residency, lies on the eastern shore of the anchorage, 3 miles southward of Tapanuli. It is situat lat. 1° 44′ 24″ N., long. 98° 45′ 50″ E.

* *See* plans of Tapanuli bay and pulo Mansalar, and Tapanuli harbour on

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Supplies.—The Dutch Government have a small supply of coal here. There is a good watering place in the bay north-eastward of pulo Panjang.

Mails and Telegraph.—Mails fortnightly; telegraph communication by land lines to other ports in Sumatra; thence by submarine cable to Batavia, &c. (*See* pp. 8 and 9.)

PULO MANSALAR* is 11 miles in length in an east and west direction, and lies in the entrance to Tapanuli bay. The island is high, with several inlets on the north side; the largest, Ronto bay, is 3 miles across, with depths of 15 to 19 fathoms. Near the south-east end of pulo Mansalar is Mansalar bay, having a depth of 16 to 22 fathoms, soft mud, and fronted by a group of islets. It affords excellent fresh water, and the adjacent islands abound with proa spars, fit for masts or yards of any size that may be required.

At the north-west end of pulo Mansalar there is a waterfall issuing from a high hill.

OUT-LYING ISLETS AND REEFS.†—Pulo Dua, a small islet, lies about 18 miles south-westward of pulo Mansalar. A bank of $4\frac{3}{4}$ fathoms lies E. $\frac{1}{2}$ N. distant $4\frac{1}{2}$ miles from pulo Dua, with a patch of less than 3 fathoms at $1\frac{1}{2}$ miles south-eastward of it; and a dangerous rock, which sometimes breaks, lies E. by N. distant $6\frac{1}{2}$ miles from the same islet; $6\frac{1}{2}$ miles farther eastward is the approximate position of another reef. A patch of $1\frac{1}{4}$ fathoms lies N.W. $\frac{1}{2}$ W. distant 4 miles from pulo Dua, with a patch of $3\frac{1}{2}$ fathoms between. At 6 miles westward of pulo Mansalar, a reef on which the sea breaks, was reported in 1894; others may exist in the neighbourhood.

William III. island, low, barren, and small, lies 7 miles south-eastward from pulo Dua.

William rock, white and above water, on which the sea breaks, lies about $8\frac{1}{2}$ miles E.N.E. of William III. island; at 2 miles northward of William rock is a dangerous patch of less than 3 fathoms, which sometimes breaks.

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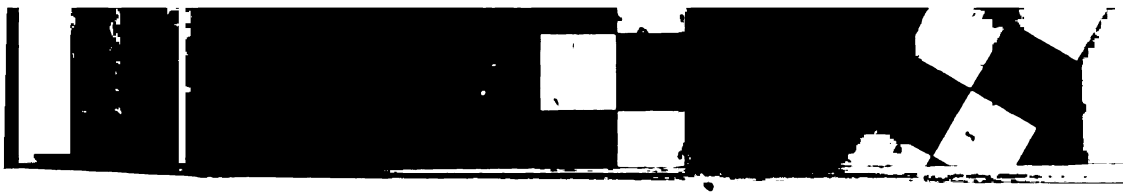
(Claudine reef), awash, and of unknown



Success reef having less than 3 fathoms water, and steep-
27 miles south-eastward of William III. island. It is about 2
in extent, east and west, does not break, and is therefore dan
to approach.

Karang Panjang, a shallow circular reef from 2 to 3 m
diameter, lies about 12 miles westward of Success reef; it a
breaks.

Amelia rock occasionally breaks. It lies about 6 miles
south-westward from Karang Panjang. A rock which break
3 miles south-eastward from Amelia rock.

Karang Lawe, breaks heavily, and lies about 15 miles south
ward of Success reef.

Directions.—As other rocks may exist in the vicinity,
passing eastward of pulo Dua and William III. island, should
close over to pulo Mansalar, which is steep-to, and to the ma
southward of it.

COAST.—Pulo Ilir, an island near the main, about one
length, moderately high and flat, lies in about lat. 1° 17′ N
affords wood and good water. There is temporary anchorage b
the island and the main.

TABUJONG ROAD* is situated in lat. 0° 51′ N., nearly 3
southward of pulo Ilir. It is partially sheltered by the S
islands, three in number, lying in a north-west direction fr
south-west point of the roadstead. Pulo Sikaladi, the nor
island is nearly 3 miles off-shore, and Batu Simunu, with
above water, lies 1½ miles beyond it in the same direction.
in passing westward of pulo Sikaladi should give it a b
3 miles.

There is anchorage in from 3 to 5 fathoms in Tabujong ro
shelter from N.W. winds southward of pulo Tabujong, the
island. A rock, with 3 fathoms close-to, lies about half a mil
west of the village.

Good water and cocoa-nuts may be obtained from the islan

Ambonia reef, about one mile in extent with a d
1½ fathoms, lies with Tanjong Tabujong bearing N. ½ E. a

* *See* plan of Tabujong road on No. 855, and chart, No. 2,760.

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Rinjaman north point E. by S. ¼ S. There is a depth of 6 fathoms close-to, but as the water is not discoloured, caution is necessary in approaching Tabujong road from the southward.

The Coast between Tanjong Tabujong and Karakara point, 15 miles to the southward, is generally avoided, as several shoals lie at a considerable distance from it. The islands named pulo Rinjaman, Telok, and Kapejong, front this coast within the shoals.

Sidoa doa mountain, 6,329 feet in height, about 13 miles within the coast line south-westward of Tabujong, is possibly a useful mark in clear weather.

Banks.—Sirene bank, one of the outermost dangers in this locality, lies S. ¾ E., distant 11 miles from pulo Sikaladi; it has 7 feet water, and 20 fathoms close-to, and does not always break in fine weather. There is a passage inshore of the bank, with anchorage, by keeping in 14 and 15 fathoms, but it is preferable to pass outside.

To avoid Sirene bank, a vessel after passing the Sikaladi islands at 4 or 5 miles distant, should keep the outer island to the eastward of North, and not to shoal less than 23 or 24 fathoms until Karakara point bears E.S.E., which will lead 2 or 3 miles seaward of the shoal.

There is also a reef which breaks, in about lat. 0° 30′ N., long. 98° 45′ E. Several others lie between it and the coast.

Two coral reefs, about one mile apart, and which sometimes break, lie with the east end of pulo Pinie bearing South, and Gunong Karakara N.E. ¾ N.; and there is the Pylades reef about 2 miles south-eastward of them. The channel eastward of these reefs appears to be clear, but there are reefs south-westward of them.

NATAL ROAD,* in about lat. 0° 33′ N., is open and exposed, and has many dangerous shoals, the outermost of which is 8½ miles off shore. The shore is skirted by a shallow bank, on which a depth of 3 fathoms is found at the distance of 1½ miles.

Landmarks.—Gunong Karakara, a hill 1,053 feet high, is situated near the northern extreme of Natal road, and with Gunong Natal is a useful mark for clearing the shoals when entering the roadstead.

Natal or Bandeira hill, 374 feet high, situated on the north

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east, and may be known by its barren aspect, and having low la
either side.

Natal stands on the open coast, and was founded by the En
in 1762, but with the rest of this portion of Sumatra was relinqui
to the Dutch. It is an open port; camphor, benzoin, and gold
are the principal articles of export; the imports are, opium, ir
flat bars, salt, piece goods of various kinds, stick-lac, and gunpo

Communication.—Mail fortnightly, *see* p. 8; telegraphs, p

Shoals.—Bayam is a small shoal with 2 fathoms least wate
10 fathoms close-to; it lies about 7 miles westward of the cen
the bay, with Gunong Karakara bearing N.E. ¼ E., distant 6 mil

Kapal, with from one to 2 fathoms, coral, lies 2½ miles south
ward of Karang Bayam, with Gunong Karakara bearing N.
distant 6½ miles.

Laut, having a least depth of one fathom, lies S.W. by W.
4 miles from Karang Kapal. These shoals seldom break. K
Ponjong, a rocky patch of 8 fathoms, lies N. by W. distant 2
from Karang Laut.

Karakara shoal, having a depth of 3 feet, coral, lies half a mi
the shallow bank fringing the shore, and about one mile S.W.
from pulo Karakara. Two other patches lie between the sho
the island.

Karang Pemuda, with a depth of 2¾ fathoms, lies with
Karakara bearing E. ½ S. distant 2 miles.

Shaftesbury shoal, is an extensive patch of foul ground ly
the westward of Ujong Rakit, the south point of Natal bay.
shoal has patches of 2 to 4 fathoms, and covers a space 1½ mi
length, by nearly a mile in breadth. Karang Brambang, ha
depth of 2 fathoms, is the south-west extreme of Shaftesbury
Karang Tete, a shoal having a depth of 16 feet, lies three-quar
a mile N.W. by W. ½ W. of Karang Brambang. Isolated pat
5 and 6 fathoms exist, as charted.

Anchorage.—Natal roadstead is one of the worst on th
being much exposed to north-west and westerly winds.

The usual anchorage is in from 5 to 6 fathoms, with t
bearing about East, distant 2½ miles.

Directions.—Vessels from the northward, bound to Nat
may, after Ujong Karakara bears E. by S. ½ S. and being in

See plan of Natal road on chart, No. 2,760.

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of 19 or 20 fathoms, steer to pass south-west of that point at 2½ miles distant, by bringing Natal fort flagstaff to bear about E. by S. ½ S.; this mark will lead between Karang Pemuda and Karang Bayam towards the anchorage. Thence edge a little to the southward, and anchor as before mentioned.

Vessels from the southward may pass either inside or outside Karang Bayam; if they keep in 12 or 13 fathoms, soft bottom, they will pass inside, or by keeping in 19 fathoms they will pass outside; when the fort flagstaff bears E. by S. ½. S., steer for the road as before.

TELOK BRAMBANG is the bay, 8 miles in length, situated southward of Natal road, between Ujong Brambang and pulo Temang.

Batahan village lies in the south-east corner of the bay, on the north point of a small river.

Shoals.—The 3-fathom edge of the shoal water fringing Natal road, extends upwards of half a mile seaward of Ujong Rakit and Ujong Brambang, and then south and eastward into Brambang bay.

Sigale, a small shoal of 15 feet, lies S. by W. ¼ W., one mile from Ujong Brambang. At one mile eastward of Karang Sigale is Durien shoal, which always breaks.

Raja Inda, a small shoal of 3 fathoms, lies S. ¾ E. 2¾ miles from Ujong Brambang.

Tompe, a patch of 6 fathoms, with from 7 to 9 fathoms around it, lies S. ½ E. distant 2½ miles from Raja Inda. As less water may exist, it should be avoided.

Anchorage.—Pulo Temang is situated at the south-east extreme of Brambang bay, three-quarters of a mile from the coast. The island is surrounded by a reef, which in places extends 2½ cables from the shore, with 6 fathoms close-to.

Sanu, a patch of 6 fathoms, lies half a mile westward of the island.

There is good anchorage in 8 or 9 fathoms, between the island and the main. A well of good water is situated abreast the anchorage and firewood may be obtained.

Directions.—Approaching from the northward, bring pulo Temang to bear E.S.E. and steer for it, which will lead southward of

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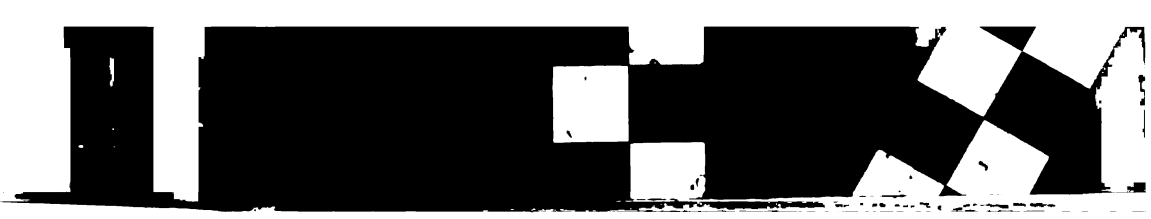
the point of the island a berth of about half



a mile, and haul in for the anchorage on its eastern side, ancho in about 8 fathoms, with the north extreme bearing W.N.W., a 3 cables.

There is a safe passage between the island and the main. S vessels coming from the southward, intending to enter Natal roa the inner passage, may pass in mid-channel between pulo Ten and the main, in 6 to 10 fathoms. Thence by keeping in a dept 9 fathoms, the shoals in Telok Brambang will be avoided; and w near Ujong Brambang, by keeping in a depth of 5 to 6 fath Shaftesbury shoal will be avoided, which shoal has a depth 7 fathoms close-to.

THE COAST.—From pulo Temang the coast trends south for 6 miles to pulo Robia, with a bight between, thence south-east for 3 miles to Biang hill 870 feet high. Gunong Bagomba, 1,227 high, lies 4 miles eastward of Biang, thence the coast trends east to Ayer Bangies bay. Isolated shoals extend for a distance of 5 n off many parts of this coast.

AYER BANGIES ROAD* is about 9 miles across in an east west direction, between Ujong Batu Belayar and Ujong Sav Buding. It contains seven islands and several isolated shoals. village of Ayer Bangies is situated on the eastern shore of the bay which the depth is about 3 fathoms at one mile distant. South of the village the water deepens.

Shoals.—The following dangers lie in the approaches :—A sun rock lies about 6 cables W. by N. from the north end of pulo Beg a similar rock lies 3 cables south-eastward of pulo Panka. detached rocks which break, lie about 8 cables north of pulo Te and Karang Sikabu, two rocks, lie 2¾ miles E. by S. from the s island.

South-eastward of Karang Sikabu, isolated shoals extend a 7 miles, the most distant being situated 13 miles westward f Pasaman, a village near the equator, in the bay of the same name

The Anchorage in Ayer Bangies road is in 4½ fathoms, holding ground, with the river entrance south of the town bea E. by N. distant 2 miles,

DIRECTIONS.—If intending to take the inshore route from Temang to Ayer Bangies, steer southward along the coast in

* *See* plan of Ayer Bangies road on chart, No. 2,760.

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10 fathoms, which will be about 1½ or 2 miles off shore. By keeping in these depths, the off-lying shoals will be avoided, and the shore, which in this space contains some bays, is safe to approach to 5½ or 6 fathoms. Enter Ayer Bangies road northward of pulo Begada and Panjang and southward of pulo Kasi, and anchor as before directed. This passage seems undesirable for large vessels, but vessels of every description, by whatever channel they enter Ayer Bangies road, must keep a good lookout for shoals.

Vessels from the northward proceeding to Ayer Bangies road outside the shoals, or to the southward, should from abreast pulo Temang, distant 7 or 8 miles, steer about S.E. by S., to avoid the extensive bank of 4 fathoms, probably less, and steep-to, lying near mid-channel, about 13 miles south-south-westward from pulo Temang. A shoal, with rocks above water, named Ular, lies about 4 miles N.N.E. ¾ E. of pulo Sembulaling, the centre of the three islets lying off the south-east end of pulo Pinie; shoals of the same name lie north-westward of it, about 4 miles from the Pinie coast.

Having avoided these shoals, and kept a good look-out for any others that may exist, course may be shaped, if bound to Ayer Bangies road, to pass north or south of Macassar shoals, lying about 6 miles westward from pulo Panka. The sea breaks on some of the shoals off Ayer Bangies road when there is much swell, and between most of them there are safe channels, but the shoals are not always discernible when the sea is smooth. Pulo Panka bearing East leads northward of Macassar shoals, and between them and a dangerous reef lying 5 miles to the north-west; pulo Panka bearing N.E. by N. leads southward of Macassar shoals. Thence pass on either side of pulo Panka to the anchorage, avoiding the shoals in the road, previously mentioned. The best channel is northward of pulo Panka, where the depths are 10 to 11 fathoms, soft bottom.

A vessel having entered the road by the most convenient passage, may steer for Ayer Bangies flagstaff, situated on a bluff point or hill at the south-east part of the bay, close to the north end of which is the river and landing place, anchoring abreast the river as before directed.

Proceeding to the southward from Ayer Bangies road within the shoals, the lead is a good guide, and there is safe anchorage; a

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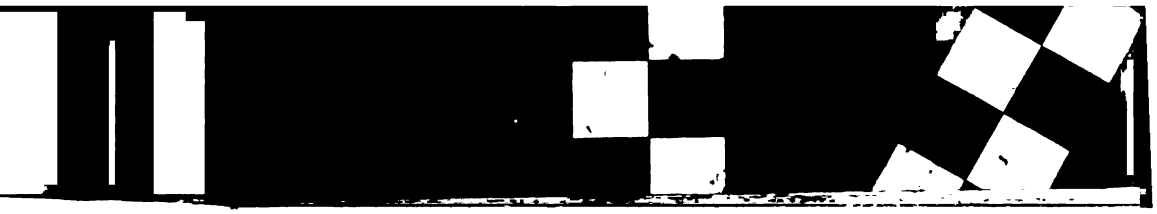

shoal, and distant about half a mile ; then haul out westward to avoid Dua reef which breaks, and also of another south-east of it. Pass between these and Van Speijk and Moller in the ot steering a course for Ujong Masang, without hauling into Pasa bay under a depth of 12 fathoms, observing not to come u 17 fathoms in passing Ujong Masang.

Sailing vessels proceding southward from abreast pulo P bound to Padang or beyond, should pass westward of the Drake Pylades reefs, keeping a careful look-out for the doubtful da charted north-west of the Drake. This route is said to be prefer when the wind is fair, but is not so convenient in contrary wind the passage eastward of these reefs, there being no anchorage. E routes seem dangerous at night.

COAST.—Aspect.—Gunong Ophir, in about lat. 0° 5′ long. 99° 58′ E., and 9,472 feet high, appears like a cone, separa from the chain of other mountains, and visible 110 miles in cl weather ; it is the highest mountain on Sumatra visible from sea. Singalang, a volcanic mountain, 37 miles to the south-eastwa is 9,439 feet above the sea. (*Mountains continued from p.* 268.)

Gunong Meropi, 9,488 feet in height, lies about 10 miles wit Singalang.

Ujong Masang, situated about 27 miles south-south-west Gunong Ophir, has a reef stretching out about one mile, wh should not be approached under a depth of 17 fathoms. Near t point are the three Masang hills, the middle or largest having a summit, and the others resembling haycocks. Between Ujo Masang and the bluff south point of Ayer Bangies road, the co is low, and forms Pasaman bay, referred to on p. 291.

Reefs.—Southward of the shoals lying in the south-east approach to Ayer Bangies road, and westward of Pasaman a Ujong Masang, are many out-lying reefs, some of which occasiona break. Van Speijk shoal lies with pulo Telok, bearing N. ½ distant 10 miles ; Moller reefs, 1½ miles apart, one of which breaks, south-eastward about 4 miles from Van Speijk shoal. Other patch lie between these and Pasaman.

Drake and Pylades reefs lie from 15 to 22 miles southward Moller reefs, each of which are charted in two positions. A dou ful danger is also shown about 20 miles south-westward of Mol

See chart, No. 2,760.

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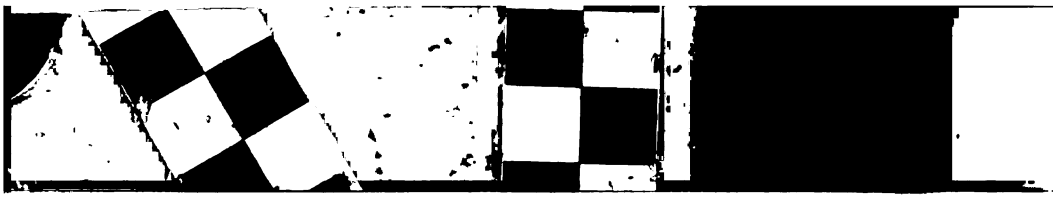

reefs. S. by W. ½ W. distant 16 miles from Ujong Masang, is Montrado reef, which breaks. Discoloured water was seen S.S.E. about 6 miles from this reef. Numerous reefs exist between these and Tiko 16 miles to the eastward, and south-eastward for about 60 miles, from 10 to 20 miles off shore; also others probably exist seaward of Montrada reef.

Much caution is requisite when navigating in this locality, which is one of the most dangerous parts of the coast, being but imperfectly known.

TIKO ISLANDS,* distant 9 miles south-eastward of Ujong Masang, are three in number, extending in a south-west direction from Tiko. They are small, wooded, about three-quarters of a mile apart, and the innermost is a quarter of a mile from Tiko village.

Between pulo Tengah or middle islet, and the outer islet there is a channel on either side of a reef which always breaks, to which a proper berth must be given.

Anchorage.—Vessels sometimes run under these islands for shelter during N.W. winds. There is a depth of 7 to 8 fathoms at about 2 cables eastward of pulo Tengah. There is also anchorage southward of the village in about 3 fathoms, under the spit which extends southward of the point.

Directions.—In approaching Tiko road, the outer islet should be approached bearing about East, or southward of that bearing. Pass within one mile of its west and south sides, where there are depths of from 15 to 17 fathoms, to avoid the numerous shoals lying from 3 to 15 miles south and south-westward of it, over some of which the swell may be seen to roll if there be any sea. Thence north-eastward to the anchorage eastward of the breaking reef.

COAST.—Directions.—The best passage from Tiko road to the southward is reported to be along shore in depths of 16 to 10 fathoms; the coast is safe to approach to 6 or 7 fathoms in many places, and the bottom is all soft, except near the shoals. A good look-out is indispensable.

PRIAMAN ISLANDS†, three in number, lie in a north-north-west and opposite direction abreast of the settlement of the same name on the main, about 1½ miles distant, and afford shelter from N.W. and westerly winds; Pulo Anso, the northernmost, has a well of fresh water.

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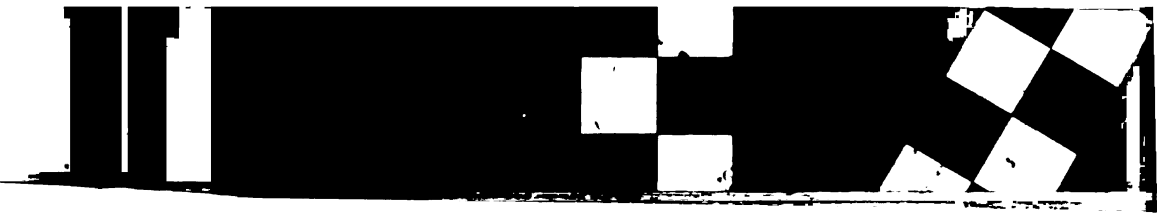

A reef projects about 2 cables from the south-west part of Anso ; and Sepulu, a patch of 4½ fathoms lies half a mile W.N. the islet. Pulo Tengah, or middle islet is distant nearly one from pulo Anso, with 3½ to 6 fathoms water in the channel bet

Pulo Ujong, the southern islet, is distant three-quarters of a from pulo Tengah, and each of them is about one cable in diar Sibarot is a breaking reef situated half a mile south-west of Ujong. Pulo Kasi lies about 3 miles north-west of Priaman half that distance off shore ; it is small, covered with trees, w sandy beach, and encircled by a reef to the distance of o 2 cables.

South-westward of pulo Kasi are several isolated reefs v break in bad weather, with deep water between ; the nearest t island is distant 1½ miles. Karang Durian, the outer reef, lies pulo Kasi bearing N.E. by E. ½ E. distant about 4 miles.

Directions.—Approaching from the northward, having pa within a short distance on either side of pulo Kasi, a vessel sh enter Priaman road by the channel between pulo Anso and Ten anchoring in from 3 to 5 fathoms under shelter of either of t Ulakan is situated about 7 miles southward from Priaman.

Priaman.—The town or village of Priaman, in lat. about 0°38′ situated on the south point of a small river, the entrance to whi so shallow that a boat cannot enter until near high water. At a half a mile off the mouth of the river, within the 3 fathom line several rocky patches, with a depth of 2 fathoms, sand, between t and the shore.

COAST.—Directions.—Vessels not entering Priaman bound to Padang or south-eastward, must steer to avoid the brea reef, half a mile west of Priaman south islet ; thence along the c at a moderate distance until pulo Sau is approached, there bein known danger in this part, though many dangers exist in the of

There is a channel on either side of pulo Sau, but that to westward is the best and most direct, care being taken to a the shoal lying three-quarters of a mile W.S.W. of it. W southward of that islet a direct course may be steered for Pad head, or for the anchorage under pulo Pisang should unfavour

See chart, No. 2,760.

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weather be apprehended, where vessels are sheltered from N.W. and westerly winds; or for Emma haven within pulo Pisang, where there is complete shelter.

PADANG.—Islands and reefs.—Northern approach.—Padang islands, seven in number, interspersed with numerous reefs, lie from 8 to 12 miles off Padang, and the coast northward of it.*

Bando, the northernmost islet, is small and encircled by a reef which is steep-to. A coral bank steep-to, lies N.W. ½ N., 4 miles from pulo Bando. Lawe and Selita reefs lie N.W. distant 11 and 14 miles, respectively, from the islet.

Pie lies 9 miles south-east of pulo Bando, between which there are a considerable number of shoals having deep water close-to.

Stort reef, having about 3½ fathoms water, lies with pulo Pie bearing E. by N. ¾ N. distant 7 miles.

Marion reef, with a depth of about 5 fathoms, lies between pulo Pie and Stort reef.

Pandang lies S.S.E. ¾ E., 5 miles from pulo Pie. Nearly midway between the two islands there is an extensive shoal having 2½ fathoms least water. (*See* Light, p. 298.)

Thoren is the southern and largest of the Padang group, and has a pyramidal stone beacon on it. (*See* sketch on chart 709.)

Dorothea reef, having 2 fathoms least water, lies nearly midway between pulo Pandang and pulo Thoren, three miles south-east of the former.

Ayer, one of the innermost islands, lies 6¼ miles eastward from pulo Pie. A reef with 5 fathoms or less lies midway between the two islets, at about half a mile northward of a line joining them. A similar reef lies one mile south-eastward of pulo Ayer.

Sibontar, the easternmost, is small, high, and flat, distant 4½ miles southward of pulo Ayer. Its north-east and east sides are foul to half a mile distant. Karang Sipakal, a shoal of 5 fathoms or less, lies 2 miles N.E. ½ E. of Sibontar, with deep water between.

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Sialang lies 2 miles south-west of Sibontar, having a safe

2 miles south-eastward from Bindalang, and a similar shoal nearly 2 miles south-west of this one.

Pulo Sau is a small islet 6 miles north-west of Apenberg h and 2 miles off shore, with a reef projecting about a quarter of a m from its south end. A shoal lies W.S.W. three-quarters of a m from the islet, as stated on p. 295.

Bellona shoal, with a depth of 5 fathoms or less, lies S.E. by distant 3½ miles from pulo Thoren, the southern islet of the Pad group. Between Thoren and Bellona shoal there is a rock al water.

Southern approach.—Pulo Niamok, situated about 18 m southward of Apenberg head, and 6 miles off the coast, is the o island in the approach to Padang from the southward. It is a island covered with trees, with a square-shaped beacon 26 feet h on its south-west side. (*See* sketch on chart 709.) Reefs exten the distance of about half a mile from the north and south side the island.

Karang Laut lies about 10½ miles north-west from pulo Niam It was formerly a breaking reef, but trees have since grown a beacon also marks it.

Between pulo Niamok and Karang Laut, lies Iskander shoal, w pulo Niamok bearing S.E. ½ S. distant 3½ miles. A similar sh lies E. by S. 4 miles from Karang Laut.

Pulo Merak, 4½ miles north-eastward of Niamok, and 2 m off shore, is 1¼ miles in extent, inhabited, and affords good water

Pulo Bintangor and pulo Seronda are small islets lying northw of pulo Merak. There is anchorage in from 10 to 20 fathoms on east side of all these islets, and shelter from N.W. and West winc

Dolphin and Serinda shoals.—Dolphin shoal lies nea 3 miles N.W. by W. from pulo Merak; and Serinda W. by distant 2 miles from pulo Bintangor, with deep water between.

Pulo Senaro lies 4 miles north-west from pulo Seronda, and covered with cocoa-nut trees. A shoal lies nearly midway betw these islets. A shoal of about 3 fathoms lies N.E. by E. about 1¾ m from pulo Senaro, and another was reported in 1895 about midw

See chart, No. 709.

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between ; a reef with a rock above water lies W.N.W., distant 2½ miles from pulo Senaro.

The above are the principal dangers in the southern approach to Padang, but it is necessary to keep a careful look out aloft when in the vicinity of any of these reefs as others may exist.

PADANG* is the chief settlement of the Dutch on the west coast of Sumatra. Its principal portion, with a fort, is situated on the north bank of the river, one mile within Apenberg head. Small craft can discharge at the railway wharf in the river.

The port of Padang is now Emma haven in Koninginne bay, nearly 3 miles to the southward of Padang (p. 301). A railway connects the port with Padang.

Climate.—Padang is generally considered healthy. There are no regular wet and dry seasons ; rain most frequently falls during the night, but sometimes it rains for two or three days in succession. (*See* Winds, p. 23, and Climate, pp. 15 and 16.)

Communication.—Padang is connected with other ports of Sumatra and with Batavia by telegraph.

There is a mail steamer from Batavia fortnightly and also one from Singapore, calling at other ports ; *see* also p. 8.

Supplies.—Provisions, bullocks, poultry, fruit, vegetables, fresh water, and coal (p. 301) are abundant. In Emma haven vessels can water from the pipes laid on to the wharves. There are no facilities for the repairs of vessels either at Padang or Emma haven. There are two tugs available.

Trade.—Padang is an open port. The principal exports are coffee, coal, gold dust, benzoin, nutmegs, and cinnamon ; and the imports are opium, cloth, and other dry goods.

Shipping.—50 vessels entered the port in 1894 ; namely, 41 Dutch, 2 English, 6 Norwegian, and one Danish ; 43 cleared.

Padang river (Batang Arau) is only navigable by craft under 6 feet draught in fine weather, the depths at low water being 9 feet at the entrance, 7 feet off the Custom house, decreasing above ; the rise of tide is about 3 feet at springs. When the wind blows strong from West or N.W., the sea breaks entirely across the entrance and for some distance seaward.

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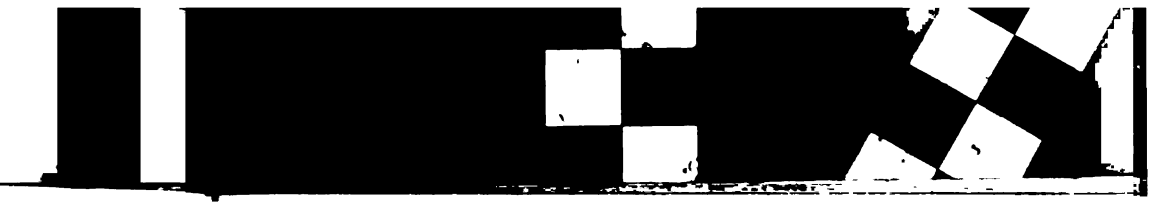

rock lies close westward of the head. In approaching from offing, Apenberg head will easily be known by its bluff aspect, the coast southward of it being bold high land; whereas the near the sea to the northward of the river is low, and all coast is low thence to Priaman, but far back from the coast the lar generally high. (*See* Light, below.)

The bank with less than 3 fathoms fronting the shore betv Apenberg head and the west extreme of Koninginne bay, ext about half a mile off these points, one mile from the shore o bays between them, and to within about 2 cables of pulo Pisang

Pulo Pisang, about 1½ miles southward from Apenberg hea about half a mile in diameter with two landing piers on its eas side; a white stone pillar and the light support are situated on hill at its south-west end. A coral bank encircles the island to distance of half a cable in places, steep-to a short distance beyon

Padang road.—Anchorage.—The best and most shelt anchorage is about one cable eastward of pulo Pisang, know Padang road, in depths of from 5 to 6 fathoms, soft clay; t depths extend over a breadth of about one cable. Tempo anchorage may be taken 1½ miles off Apenberg head in a 12 fathoms, but since Emma haven is now available the ancho is probably not used.

LIGHTS.—From an iron lighthouse, painted white, erected pulo Pandang, is exhibited, at an elevation of 108 feet, a *fixed* light visible in clear weather for a distance of 19 miles.

A *fixed red* harbour light, 16 feet above high water, is exhil from the foot of the north-west side of Apenberg, visible betv the bearings of E. by N., through south, and S.W. from a distan 4 miles.

On the south-west point of pulo Pisang, from an iron sup 75 feet above high water, is exhibited a *fixed white* light, visib clear weather from a distance of 12 miles. (*See* also lights, p. 30

Tides.—It is high water, full and change at Padang, at 6h. 5 springs rise 3 feet.

Directions.—Mount Talang, 8,330 feet in height, situ about 18 miles within Apenberg head, Padang hill, 1,056 fee which there is a signal staff, near Apenberg, and mount Pange northward of it, should be conspicuous objects when approac

See plan No. 212, and chart No. 709.

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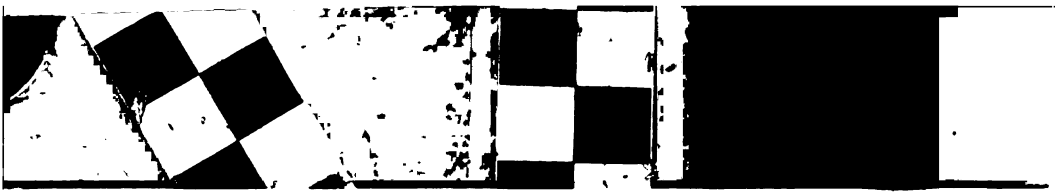

Padang in clear weather ; the islets mentioned in the approaches are possibly all easily identified, Pandang having a lighthouse, and two others being marked by beacons.

Vessels from the northward should make pulo Bando bearing about E. by S. ½ S.; it may then be steered for on that bearing and passed on either side at about half a mile distance ; this course should be continued until about 5 miles eastward of pulo Bando, whence steer for Padang road, the anchorage under pulo Pisang, passing between pulo Ayer and pulo Sau.

Entering Padang road from the westward, which appears to be the best route, approach Padang lighthouse bearing East, to avoid Stort and Marion reefs, thence passing close southward of pulo Pandang, and between Sibontar and Bindalang to the anchorage under pulo Pisang ; or proceed for Emma haven where there is secure anchorage.

The south channel is preferable in proceeding to the anchorage under pulo Pisang, passing south of that island at about a quarter of a mile distant, and then steering for a berth off the south pier, where there is shelter from West and N.W. winds.

Steam vessels from the southward may take the passage on either side of pulo Niamok, recommended for sailing vessels ; or on either side of Karang Laut, on which there are two trees with a pole fastened to one of them, or on either side of pulo Thoren on which also there is a beacon ; thence as will be seen on the chart, No. 709.

A sailing vessel may naturally take either of the routes for steam vessels which will give her a leading wind. Tugs are available.

Approaching Padang from the southward, with a favourable wind a sailing vessel should make pulo Niamok, a low islet with trees from 30 to 50 feet high, with a square tower 26 feet high on its south-west extreme. The island should not be brought to bear westward of N. by W. ½ W., nor approached within one mile, as reefs extend about 5 cables from it. Having passed Niamok at about one mile distant, on either side, course should be shaped to pass the same distance west of pulo Merak, and at about half a mile westward of pulo Bintangor and Seronda to avoid Dolphin and Serinda shoals. There is also a narrow and safe passage eastward of pulo Bintangor and pulo Seronda with depths of 20 to 30 fathoms, and which is generally considered the best.

Having passed pulo Seronda by either channel, it should then be brought to bear South, steering North for pulo Pisang lighthouse, which course will lead about midway between Marlboro' shoal and

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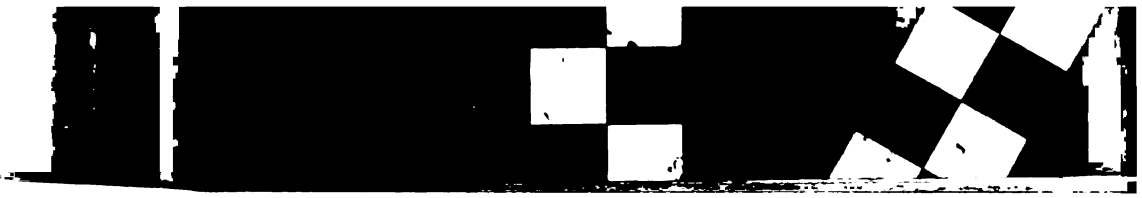

the 3 fathom shoal lying 1½ miles north-eastward of Pulo Senar Padang road, the anchorage within pulo Pisang. If bound to Er haven, the course is eastward of Marlboro' shoal buoy.

KONINGINNE BAY.—Emma Haven (native name T Bajur).—In Koninginne bay situated about 3 miles southwar Padang, a breakwater half a mile in length in a south-east direct has been constructed from the western shore, enclosing a space al half a mile square, with a depth of about 4¼ fathoms, forming En haven.

A breakwater 300 yards in length has been built on Karsik sh parallel to and distant about 500 yards from the main wharves. space within is sheltered from all winds; but that portion of the eastward of the breakwater is open to south-west winds.

Wharf accommodation.—Coal.—Emma haven affords ev accommodation for vessels of moderate draught. There are w houses, three berths alongside the wharves, each about 280 fee length, one of 180 feet in length, and a shorter one where colliers load; there is a low water depth of 26 feet alongside; railway trucks run on to the wharves. The railway is conne to the Ombilien coal fields in the interior, and with Padang. Th mines belong to the Crown; 72,000 tons were produced in 189 which 20,000 were shipped from Emma haven for Java.

There are two steam cranes with a lifting power of 3 to 4 tons, also hydraulic cranes available for loading and discharging ca Vessels cannot lie alongside each other, as there is generally much swell; there are several mooring buoys. Vessels are coale the buoys by lighters. Those with petroleum are not permitte enter the harbour, and have to discharge at pulo Pisang.

Communication, supplies, &c. *See* Padang, p. 298.

Shoals.—Buoyage.—Marlbro' shoal, which usually break the outer and south-westernmost danger in the approach to En haven. It lies S.S.W. distant $1\frac{1}{10}$ miles from Pasir Gadang, an marked on its south side by a black buoy with ball.

Pasir Gadang on the west side of the approach, between Marl shoal and Jungut Batu Pati, is a shoal about 2½ cables in len with a sand islet about 200 yards in length near its eastern side. iron black beacon surmounted by a white ball is erected on it, Jungut Batu Pati bearing N. ½ E. distant about 8 cables. Patche one and 1½ fathoms lie between Pasir Gadang and Marlbro' shoal

See plan of Koninginne bay and Padang road, No. 212.

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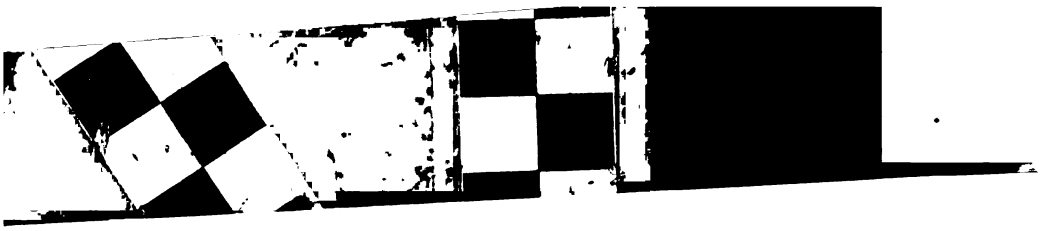


Two black nun buoys mark the edge of the shore bank between Pasir Gadang and the breakwater.

On the eastern side of the fairway, a white buoy marks a 4-fathom patch situated about one mile S. by E. of the breakwater light.

In the haven, two white buoys mark the 4-fathom edge of the bank extending from the eastern shore, and a similar buoy the south-west extreme of the Karsik breakwater. A black buoy marks the north-east extreme of this breakwater.

The toe of the outer breakwater is marked by a black buoy.

Lights.—The three white buoys in the haven show *green* lights at night, and the black buoy a *red* light.

LIGHTS.—On the extreme of the outer breakwater is exhibited from an iron davit at an elevation of 19 feet, a *fixed red* light visible southward from a distance of 4 miles between the bearings of N. 84° E. and North.

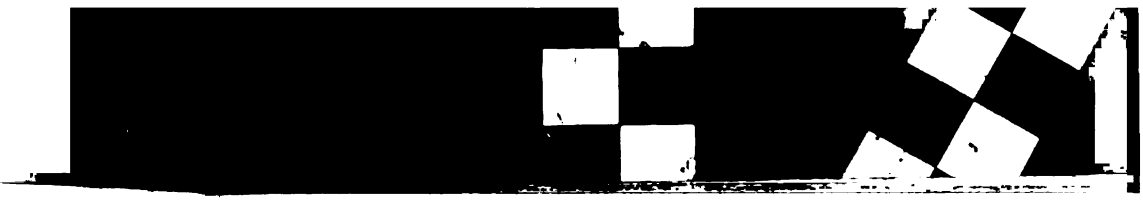
On Ujong Sungi Bramei or Batu Mandi, on the east side of entrance to Koninginne bay, from an iron framework 47 feet in height, is exhibited at an elevation of 548 feet above the sea, a *flashing half minute white* light, visible between the bearing of S. 36° E. through east and N. 17° E., from a distance of 30 miles in clear weather. There is a signal flagstaff near it.

Directions.—The directions for Padang road from the southward, p. 300, apply also to Emma haven.

From abreast and eastward of Marlboro' shoal buoy, course must be shaped to pass between the black buoys on the port hand and the white buoys on the starboard hand, to Emma haven. The turning around Karsik shoal is somewhat sharp for long vessels, and requires care. Vessels enter at night with local knowledge.

Pilots.—Native licensed pilots for the west coast of Sumatra are obtainable at Padang and Emma haven. A vessel desirous of entering Emma haven after sunset must report this by signal to the lighthouse keeper on Ujong Sungi Bramei, who will telegraph to the harbour master, and as soon as a satisfactory answer is received, he sends up a rocket as a signal that the pilot will come off and bring the vessel in.

THE COAST, from Padang to the distance of 30 miles southward is intersected by numerous bays and inlets, several of which, being



excellent harbours. The land near the sea is generally of mode height, and, farther in the country, more elevated. Mount Tal 8,330 feet in height, is before referred to.

BUNGA BAY* is separated from Koninginne bay by U Sungi Bramie, on which there is a light and signal station; p. It is a safe anchorage with from 14 to 15 fathoms in the entra and from 7 to 10 fathoms farther in. Pulo Cassie, a small islet, near the middle of the northern arm of the bay, with a shoal a 3 cables N. by E. of it, and another about 7 cables South.

The directions for approaching Padang from the southward (p. apply here also. When in the entrance, borrow towards the nort side to avoid the shoals off pulo Cassie, and anchor between it the island, or nearer to the head, where there is good shelter. the south-east angle of the bay there is anchorage in 10 to 12 fath a little open to westerly winds. Shallow water extends off point and island that form the north-east side of this ancho and there is the shoal nearly in the middle of the entra mentioned as lying south of pulo Cassie. There are several vill in Bunga bay.

Sungi Pisang bay lying close southward of Bunga bay, is a one mile across, and open to westerly winds. Two rocks lie in entrance, with depths of 1¼ and 2 fathoms; abreast the rocks, clo the northern shore, there is a narrow passage with 15 to 17 fath decreasing inside to 8 and 9 fathoms; there it also a narrow pas between pulo Kuah off its entrance, and the southern point of bay.

Sungi Pinang bay lies southward of Sungi Pisang bay, a free from outlying dangers. In this bay vessels are sheltered almost every wind, it being partly sheltered by pulo Merak and open to S.S.W.; the depths are from 26 fathoms in the fair decreasing to 11 and 6 fathoms at its head.

Trussan bay, fronted by pulo Tyabeda, is about 5 mile extent, and safe, with general depths of from 8 to 16 fathoms, bottom. It is a place with considerable trade. There are passages into the bay, on either side of pulo Tyabeda.

The northern one is about one-third of a mile wide; in ente by this channel, the northern shore must be kept, to avoid a 2-fath

* *See* plan of Bunga bay on No. 866.
See chart, No. 709.

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shoal lying about 3 cables west from the north-west point of pulo Tyabeda. The north-east point of Tyabeda open of the west point, leads northward of this shoal. Within the entrance the channel is safe.

The entrance, southward of pulo Tyabeda, has three islands; pulo Trussan, the largest, lies in the middle; the others, on the north side, are connected to the shore by reefs. There is a channel about 1½ cables wide between pulo Trussan and the northern islets, with depths of from 10 to 20 fathoms.

The channel southward of pulo Trussan is said to be a very narrow passage with only 3 feet water, but this statement is doubtful, as the chart shows 18 fathoms in it.

Pulo Saytan, in the middle of Trussan bay, is surrounded by shallow water and dry rocks. Upon the main, abreast and close to the shore, there is a watering-place. A line of shoals extends north-eastward from pulo Saytan to the head of the bay.

OFF-LYING ISLETS.—Several islands front Tyingkok bay, southward of Trussan bay.

Pulo Ayer Besar, the largest of the islands, lies about 8½ miles south-west of Tyingkok bay, and has a conspicuous round hill; on the south side of it is pulo Ayer Kechil, with a reef projecting from it nearly to the larger island. Both are inhabited.

Pulo Kombang and pulo Babi lie nearly mid-way between these islands and the mainland to the northward, and pulo Semanki, a group of rocks, lies between them and Tyingkok bay.

Wood and water, poultry and sheep, may be procured at pulo Babi.

Panyu, the outer islet, lies 8 miles south-west of Ayer Besar, and 10 miles off shore. All these islands have deep water within a short distance.

Reefs.—A reef with a depth of 2 fathoms, which sometimes breaks, lies with the hill on pulo Ayer Besar bearing E. ¾ S. distant 5½ miles; a patch of about 4 fathoms, half a cable in extent, lies 2¼ miles W. by N. of it, and one of 4¾ fathoms is charted half a mile north-west beyond; they are probably identical. Vessels should

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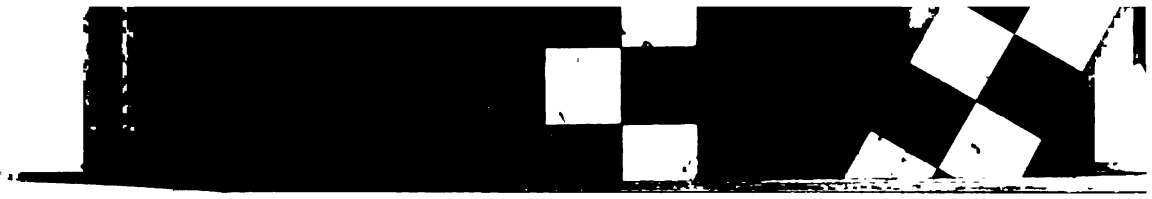

Erasmus reef, with a depth of 4 fathoms, lies N.N.W. dista
1¼ miles from pulo Panyu; a reef also lies N.E. by E. dista
4 miles from the same islet. When there is much swell the sea
seen to roll over it.

These reefs are all steep-to, and must be given a wide berth.

TYINGKOK BAY lies about 10 miles south-eastward
Trussan bay, and is the northernmost of four bays in the extensi
bight formed between Ujong Baton and Ujong Telok Kersik. It h
regular depths and good anchorage at its north-west part.

Directions.—Anchorage.—Approaching Tyingkok bay fro
the northward, vessels may pass on either side of Niamok, then
steering for pulo Kombang to avoid the shoals south-eastward
Niamok.

Between pulo Kombang and Ayer Besar the depths are from 16
25 fathoms. From between these islands, steer to pass southwa
of the Semanki group, and anchor off pulo Tyingkok in 12 fathon

Painam harbour lies eastward of pulo Tyingkok, with a dep
of 9 to 10 fathoms in the channel southward of the island, a
from 4 to 7 fathoms in the harbour. Painam is a place of conside
able trade, and has a wharf for the convenience of lading a
unlading goods.

Batuwang bay and **Telok Kersik**, are two small bays lyi
southward of Tyingkok bay. Both afford good anchorage in modera
depths, but open to westerly winds. About 6 miles south-eastward
situated Batang Kapas bay, having also good anchorage ground, b
open to south-west winds.

OFF-LYING ISLETS.—The islets and reefs lying between pu
Panyu and Ujong Indrapuru, from 5 to 15 miles off the coast, wi
now be described.

Ayer Karaba Kechil lies 9 miles south-eastward of pu
Panyu, and 5 miles from Ujong Radya on the main. A sunken ro
lies W. by N. ¼ N., distant 5½ miles from Ayer Karaba Kech
reported in 1893. Two miles northward of Ujong Radya, and o
mile off shore, lie some rocks, dry at low water.

See chart, No. 709.

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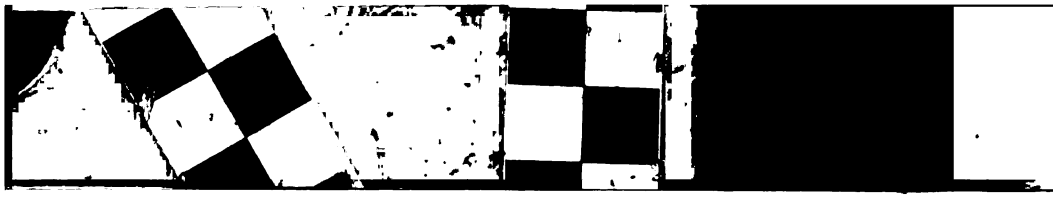

Ayer Karaba Besar lies 4 miles south-westward of Karaba Kechil. A shoal lies W.N.W. distant 2¼ miles from Karaba Besar, and there is said to be another about 1½ miles to the southward.

Kersik or Sandy island lies about 7 miles south-eastward from Ayer Karaba Besar. Within a distance of 6 miles of pulo Kersik, and between the bearings of W.S.W. and South, there is a cluster of shoals, some of which break occasionally.

Katang Katang, or Tree island, lies 10½ miles southward from pulo Kersik, and is nearly 15 miles off shore. A sandbank lies E.N.E. distant 3 miles from it.

Baringin, the southernmost of the chain of islands in this locality, lies 4 miles eastward from pulo Katang Katang.

A shoal lies 1½ miles S. by W. ½ W. distant 1½ miles from Baringin; and another at 4 miles South from the same islet.

Karang Semedang is a reef 3 miles off the coast on which the sea breaks in bad weather, with mount Linga bearing E. by S. distant 6 miles. Between the distances of 2½ and 5 miles N.W. by N. from Karang Semedang, and 2 miles south-westward of Palangi village, are four shoals. Also abreast Lakitan hill, at one mile off shore, there is another shoal.

Ayer Adye river may be known by mount Linga or Volcano mount, a remarkable round hill covered with trees near the sea, about 3 miles to the northward; the entrance is not easily made out. It is best to anchor in not less than 8 fathoms, about 2¼ miles off shore, with the flagstaff bearing East. If north-westerly winds are apprehended, a sailing vessel should anchor in 12 or 13 fathoms, in order to clear Indrapura point, should she be unable to remain, as this anchorage, which is little visited, is not considered safe with those winds.

The bar is dangerous for boats at low water, and at all times when there is a swell. The village is 2 miles up the river.

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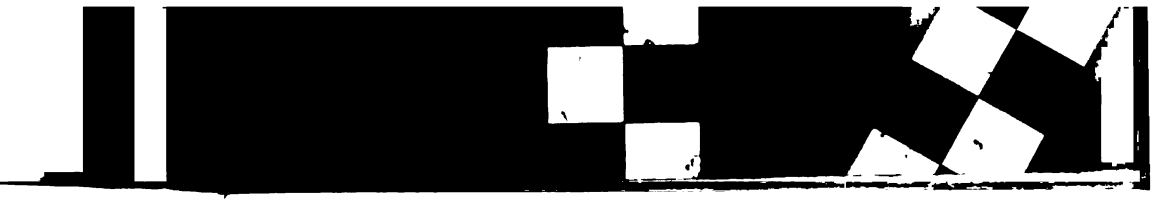
Pangasan village is situated on the coast at about 2 miles north-



Ujong Indrapura, 14 miles southward of Ayer Adye, is l and its extremity covered with trees. From hence to Benku there are no islands near the coast.

COAST.—Aspect.—Directions.—Proceeding southward fr abreast Tyingkok bay it will be prudent, if coasting along, to k 4 or 5 miles off shore when southward of Ujong Radya, to av Karang Semedang and other reefs northward of it.

Mount Lakitan, about 2 miles within Ujong Radya, Lakitan l 8 miles to the south-eastward, and mount Linga 11 miles farther that direction, will be of much assistance in fixing the position o vessel when navigating in this locality. At about 27 miles inla are the high peaks of Gunong Korintji (3,700 feet) and Pat Sambilan. There appears to be no danger inshore between Kara Semedang and Ujong Indrapura other than the shelving shore ba in the bight northward of that point.

Southward of Ujong Indrapura, in a sailing vessel bound Benkulen, if the wind be steady, a direct course may be steered along t coast, keeping from 6 to 15 miles off; but with light winds it will proper to preserve moderate depths, from 15 to 25 fathoms anchoring, if requisite; never exceeding 30 fathoms, nor borrowi under 10 fathoms towards the shore, in case of getting into fo ground.

In the daytime, with a good look-out aloft, most of the dangers w be visible; at night, a vessel should keep well outside all the islet

Moko Moko, in about lat. 2° 34′ S., lies in a small bay, and w once an English settlement. The two points that form the bay a covered with tall trees. Approaching Moko Moko from the northwar the position of the doubtful shoal referred to in the foot note on p. 30 and which is about 6 miles off shore, should be passed with cautio keeping within 3 or 4 miles of the shore. When the houses ar flagstaff at Moko Moko village are seen they may be steered fo anchoring in 10 fathoms, soft ground, with the flagstaff bearin E. by N. distant 2½ or 3 miles, and Moko Moko peak, which remarkable, N.E. ½ N. Small vessels may, if requisite, anch closer in.

Telegraph.—Moko Moko is connected with the telegraph syste of Sumatra, p. 9.

See chart, No. 2,761.

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Surf.—The native boats must be employed in landing, on account of the surf. The coast in the neighbourhood is a sandy beach on to which a heavy swell is generally setting, as is usually the case on this coast south of the equator.

A reef extends from Moko Moko, to the distance of 7 miles southward, and to about 1½ miles off shore.*

Ayer Dikil, about 10 miles southward of Moko Moko, and a little southward of a bluff point covered with trees, may be recognised by the denseness of the trees on each side of the mouth of the river. The bar of the river is dangerous and unnavigable, even for boats. There is anchorage off its mouth in 8 to 10 fathoms.

Bantal river is 7 miles south-eastward of Ayer Dikil, and may be known by two white cliffs a little to the northward of it.

The best anchorage in the road is in 8 to 9 fathoms, ooze and sandy bottom, with the white cliffs N.N.E., and the river entrance N.E.

Between Bantal and Ipu are three rivers, the Teramang, Ayer Itam, and the Reta; Teramang, the northernmost, has a small red cliff on the north side of the entrance: the coast, embracing those rivers, may be approached to about 12 fathoms, regular depths, in most places.

Ipu village, in lat. 2° 59′ S., may be known by three red cliffs to the southward, and three green hills near the sea.

Large vessels may anchor in 9 or 10 fathoms, with the central cliff bearing N.E. by E.; here the roadstead is tolerably clear, whilst farther in the bottom is foul.

The coast southward of Ipu consists of reddish cliffs, and is fronted by a coral bank which stretches out 4 or 5 miles, with depths of 6 to 10 fathoms on its outer edge; it extends from Ipu to Ketaan, a distance of 30 miles, and should not be approached under 10 or 12 fathoms, as it is steep-to. Near its northern edge is Swallowfield rock, bearing S.W. ¾ W. about 5 miles from Ipu, with a depth of 14 feet, and from 8 to 16 fathoms all round. Ipu bearing eastward of E.N.E. leads northward of the bank and rock.

Ketaan village, in lat. 3° 22′ S., has a white cliff to the southward like a castle.

See chart, No. 2,761.

* There is said to be a bank of rocks and sand, having 2½ or 3 fathoms water on [illegible] 12 miles W.N.W. from Moko Moko.—*Horsburgh.*

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Nearly midway between Ipu and Ketaan there is the small villa of Sabelat, appearing like an opening betwixt reddish cliffs; Kete has a similar appearance.

Layi and Pali are two small villages situated at 18 and 23 mi south-eastward of Ketaan, with red cliffs between them.

From Ketaan the distance is 35 miles to Benkulen, and the co in this space is safe to approach in places to 11 or 12 fathor the depths being more regular than farther northward; fr 12 to 20 fathoms are good depths to preserve when coasting.

BENKULEN, an open port, was formerly the principal Briti settlement on this coast, but with the advance of Singapore, tra declined so much that it was finally given up. The settlement w first formed on the banks of the river, but the locality being unhealthy, it was removed to Ujong Karang or Tapu Padri, t south point of the bay, where fort Marlborough was built on grou a little more elevated in the year 1685.*

Climate.—The town is unhealthy. Rain is frequent during t months of January and February, the westerly monsoon perio *See* p. 16. Land and sea breezes prevail here.

Supplies.—Coal.—Bullocks, poultry, fruit, and vegetables various kinds may be obtained here, and water from a cistern ne the landing place. Coal mines, 8 square miles in extent, have be found at Buket Sumur, about 30 miles distant by the road.

Communication.—Mail fortnightly from Batavia; telegraph land lines with other ports in Sumatra, p. 8, 9.

Benkulen river, falls into the bay about 1½ miles north-ea ward of the town, has from 4 to 6 feet on the bar, and fro 8 to 12 feet within. *See* Weather signal, p. 310.

Aspect.—North-eastward of the river the land is high and rugge one of the hills, named Bunku or Sugar Loaf, about 1,029 feet hig is a conspicuous mark in some directions from seaward.

Lumut mount to the north-westward, 1,806 feet in height, a Dempo, 3,170 feet, are peaks on the same range of hills. Northwa of this range is another named Ambong Bras Gebergte, on which Gunong Korintji, before mentioned.

See plan of Benkulen road on chart, No. 2,761.

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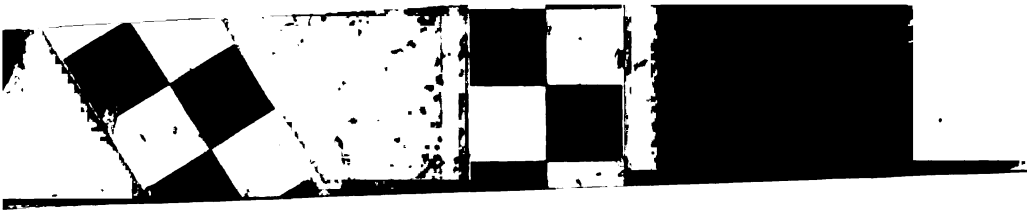

BENKULEN ROAD may be considered as lying between Ujong Pedattie, 5 miles northward of Benkulen, and Ujong Siabung or Buffel point at about 7 miles to the southward, forming on either side of the town a large bay.

The usual anchorage is between the town and pulo Tikus, in about 12 fathoms, at about 2 miles N.N.E. ½ E. from the island. Under that depth the bottom is generally rocky, and also farther out it is foul in places. Vessels during southerly winds may anchor in 13 fathoms under shelter of Tikus reef, over mud bottom.

N.W. winds, which prevail from September to March, send a heavy sea sometimes into the road.

In this season, vessels that do not go into pulo Tikus basin, should anchor eastward and within a mile of Tikus lighthouse, in about 15 fathoms, where the sea will be partly broken by the reef. Loading and discharging cargo may be done from this position in favourable weather as if a vessel were in the usual anchorage in the road; for sailing boats, passing to and from the town, are confined to one trip in 24 hours by the land and sea breezes.

Weather signal.—A blue flag is hoisted on the iron standard of the harbour light at the town, whenever it is dangerous for boats to go in or out.

Inner road.—Buoyage.—The inner road, with 4 to 6 fathoms water, lies north-westward of the fort, and within Patah Sambilan reefs; it is frequented by small vessels in the fair season, for the convenience of loading and unloading. The approach is northward of the buoy with ball, marking the north extreme of Patah Sambilan and the buoy marking the 5 fathom edge of the shore reef; but the buoys are not to be depended on. The southern entrance, between the south Sambilan and the shore, has a depth of 3 to 6 fathoms, but is not buoyed.

The landing place is protected from the sea by a rocky ledge fronting it at a distance of 150 yards: boats pass round the eastern point of this ledge, and then haul in to the southward for the wharf, which is about 60 feet long, with a depth of 3 feet alongside at low water.

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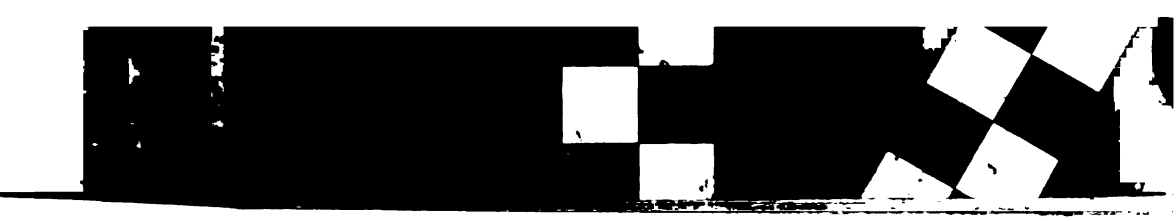
Pulo Tikus or Rat island basin.—Pulo Tikus lies about



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Tikus lies about
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61.

reef about 2 miles in extent in a north-west and south-east directi
partly dry at low water, affording shelter from on-shore win
Detached patches of 4½ fathoms lie E.N.E. of the main reef, at abo
three-quarters of a mile from the lighthouse. The island is low a
small, with a lighthouse, a few palmyra trees 80 feet high forming
clump, and a useful landmark; also some houses for receivi
pepper, a small battery for its protection, and a landing stage.

There is an excellent basin in the north-east side of the reef, wi
depths of 5 to 7 fathoms, soft mud, and 3 to 2½ fathoms at its upp
end. The passage in is close to the edge of the reef on the we
side; several detached rocky patches lie off the east side, with 7 a
8 fathoms water close-to.

Vessels having a cargo to receive or deliver at fort Marlboroug
used generally to warp into this basin, where they moored head a
stern to anchors laid upon the reef, which is steep-to. From th
basin goods were conveyed to or from fort Marlborough, with t
same facility as from the road, the boats being able to make one tr
daily with the land and sea breezes. Here vessels were complete
sheltered from the sea by the reef; whereas it often runs so high
the road that goods are unsafe in the boats alongside. N.W. win
sometimes give very short warning of their approach. It is probab
that most of the trade is now done by small coasting steamers w
would use the Inner road.

Shoals.—Gusong Sungi Lamu, lying about 1½ miles south-we
from Ujong Pedattie, is the northernmost shoal in the approach
Benkulen. The least water is 2½ fathoms, with 5 to 7 fathoms at
short distance.

Patah Sambilan, or North and South breakers, are the dangero
reefs which lie from a half to 1½ miles off the town. They do n
always break, but as they are liable to do so suddenly, boats shou
not attempt to cross them.

Middle shoal, with a depth of about 4 fathoms and 8 to 9 fathom
close-to, lies nearly midway between the South Patah Sambilan an
Gusong Lampuyang.

Gusong Lampuyang, two reefs, at about 1½ miles south-eastward
Middle shoal, are generally discernible by the sea breaking on them
between them and the shore the depth is 8 fathoms. These reefs a
avoided by keeping in more than 11 fathoms water.

See plan of Benkulen road on chart, No. 2,761.

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Karang Bayan and Karang Ikan Tandu are two reefs nearly connected, with depths of 5 and 6 fathoms, and situated between West and W.N.W. of pulo Tikus, distant 2 to 2½ miles; between these reefs and the reef surrounding pulo Tikus there are depths of 16 fathoms.

Karang Lebar, or Asia shoal, is the southern shoal in Benkulen road. It is about one mile in extent, with a depth of 4 fathoms, probably less, coral and sand, and lies about 4 miles westward of Ujong Siabung. There is a heavy ground-swell on it, which sometimes breaks in bad weather.

Tides.—It is high water, full and change, at Benkulen at about 6 hours, rise from 3 to 5 feet.

LIGHTS.—On pulo Tikus, from an iron frame painted white, is exhibited at an elevation of 52 feet above the sea a *fixed white* light, which should be visible in clear weather from a distance of 12 miles.

At Benkulen, north-eastward of the tower of fort Marlborough, is exhibited from a white iron support 26 feet in height, a *fixed red* light at an elevation of 60 feet above the sea, visible between the bearings of E. by N. and South, from a distance of about 4 miles.

Directions.—Approaching Benkulen road from the northward, bring pulo Tikus to bear southward of E.S.E. to avoid Karang Bayan and Ikan Tandu. The Sugar-loaf, bearing N.E. ½ E., or eastward of that bearing, until pulo Tikus lighthouse bears S.E., leads northward of them, whence course may be taken for the anchorage in the road or for Tikus anchorage.

In working to or from the road by this channel, a vessel may stand near the edge of pulo Tikus reef, and to 13 fathoms towards the main.

Coming from the westward, the trees on pulo Tikus will be seen before the Sugar-loaf, which is a conspicuous hill on a nearer approach.

Approaching the road from the southward, a vessel should not bring pulo Tikus to the westward of N. ½ W. until within 3 miles of it, which will lead westward of Karang Lebar; then she may steer N.N.E. for the road. There is a channel 3 miles wide, within Karang Lebar, with general depths of 17 fathoms. Vessels using this

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bears East, and may then steer for pulo Tikus anchorage ; Ujc
Siabung may be approached within a half to three-quarters of a m
when working in ; but a reef projects from it about a third
a mile, with 3 fathoms on its edge, and 13 to 14 fathoms close·
Karang Lebar may be seen by the overfalls on its edges.

Pulo bay, 8 miles to the southward of Benkulen, was forme
an excellent land-locked harbour, 2 miles in length by one mile
breadth. It had an entrance about 2 cables wide, with a depth
3½ fathoms, but the entrance has silted up and it is no lon
available as an anchorage.

Silebar river, about one mile north-eastward of Pulo bay, l
4 feet water on its bar ; within the bar it forks, stretching both nor
ward and southward, near and parallel to the shore, the southe
branch leading to a lake contiguous to the sea, south-eastward
Pulo bay.

Ujong Kungkaai, a round bluff headland covered with tr
discernible from Benkulen road, is about 2½ miles southward
Pulo bay.

About 4 miles south-eastward of this point and 2 miles off sho
there is a patch of 7 fathoms, rock, with 12 fathoms between it a
the shore.

COAST.—General remarks*.—From Ujong Kungkaai t
coast of Sumatra extends in a south-easterly direction 180 mi
to Sunda strait. Throughout its extent it is almost entirely wi
out shelter, and being beaten by heavy surf the few frequent
places are dangerous for landing. The country is also deficie
in some of the productions which are found north of the equat
It is generally bold and safe to approach, and the land is mou
tainous a short distance in-shore. Between Benkulen and Man
(lat. 4° 30′ S.), regular depths over a sandy bottom are fou
where, if it fall calm and the current be unfavourable, a saili
vessel may occasionally find anchorage in moderate depth
Farther to the southward the coast becomes more steep, moder
depths extending out only a short distance, until Little Fortu
island, near Flat point is approached, where they extend 8 mi
from the main.

Pring, situated about 35 miles south-eastward of Ujong Kungka
is a small pepper port ; the best anchorage is in 12 fathoms, mu

* *See* chart, No. 2,761.

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In less depth the ground is foul and rocky. A shoal, which breaks in bad weather, extends about 2 miles off shore.

Manna point, situated about 17 miles south-eastward of Pring, projects considerably and may be known by a small hill with palmyra trees on it.

A reef extends 3 miles westward of Manna point, to which a wide berth should be given.

Manna town, formerly an English settlement, lies north-east of the point, off where there is anchorage in 10 to 12 fathoms.

Penu, another pepper port, lies about 4 miles north-westward of Manna, and Pedang at about 14 miles south-eastward. A small cascade falls perpendicularly from the steep cliffs which line the shore near Manna, but landing should not be attempted as a heavy surf generally prevails along this coast.

KAWUR or SAMBAT BAY, situated in about lat. 4° 51′ S., is about 5 miles wide. In the north part of the bay, westward of Sambat river, off the village of Bundar, there is good shelter from N.W. and westerly winds, in 9 or 10 fathoms, sand and mud bottom.*

On the south-east side of the bay is the settlement of Kawur, on the north side of a bight half a mile wide, where small craft close in find shelter from southerly winds.

The anchorage off Kawur is in 11 or 12 fathoms, with the Resident's house bearing about E.N.E., distant one mile. The narrow boat passage leading to the factory is between two coral reefs which break at times.

PULO PISANG HARBOUR.†—Pulo Pisang Kroé, a quartz rock about one mile in diameter, lies about 30 miles south-eastward of Kawur, and 1¼ miles off shore; the intermediate coast is steep-to. Between this island and the main, there is good anchorage and shelter from N.W. and westerly winds, in from 12 to 15 fathoms, with the rocks near the east part of the island bearing South, distant about 3 cables, and at three-quarters of a mile from the main.

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A reef, which extends in places about one-third of a mile,

of the island, with depths of 36 to 40 fathoms about a quarter a mile off. Shallow water with about 3 fathoms over the visi patches of coral rock, extends from the north part of the isl towards the main.

At about one mile northward of pulo Pisang Kroé is a reef rocks, on which the sea generally breaks, having from 7 to 20 fatho close-to, and apparently connected with the shore, which is dist about 1½ miles; 5 miles northward of it is a shallow patch about one mile off shore.

Directions.—Mount Pugung, a high and remarkable mount about 12 miles northward of pulo Pisang Kroé, may be discern a considerable distance from the offing. Vessels should approa the anchorage under pulo Pisang Kroé, from the southward; th appears to be no dangers to avoid excepting the reef extendin short distance from the island. Small craft may enter by northern channel by keeping at about 2 cables distant from island shore.

Kroé road, lies 6 miles south-eastward from pulo Pisang Kr at the head of a bay which has deep water, there being ab 30 fathoms at less than half a mile off shore in places. The town situated, in lat. 5° 11′ S., on the bank of a small river navigable boats at high water, and close to the northward of Sillalu rock, south point of the river, which is visible for some distance from offing.

Foul ground extends from Sillalu rock or point for a distance 2 cables, with deep water close-to; and a shoal of 2½ fathoms, steep- lies half a mile off shore at about one mile northward of the rock.

The anchorage in Kroé road is in from 14 to 18 fathoms, at ab half a mile northward of Sillalu rock, and west from the Residen house. It is safe in the S.E. monsoon, being well sheltered fr these winds by Karang Peringan, the south point of the bay. approaching the bay, the Resident's house should be kept op northward of Sillalu rock or point, to avoid the reef extending Karang Peringan point.

Supplies.—Bullocks, good water, and some other supplies m be procured here.

Tinnambang bay* lies about 8 miles south-eastward of Kr road, in about lat. 5° 20′ S., with shallow water extending about o

* *See* plan of Tinnambang bay on chart, No. 2,761.

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mile off shore between. There is anchorage in about 10 fathoms near the head of the bay, but it affords little shelter. Landing may be effected in S.E. winds on the south side of the bay.

Bengkunat bay lies about 30 miles south-eastward of Kroé road; Bengkunat village lies on the north side of a low point having on it palmyra trees; the bay is interspersed with rocks, and a shoal about 6 miles in length, lies from 3 to 4 miles off, but there is a passage for small craft within it. A vessel intending to touch at Bengkunat should anchor well out to avoid rocky bottom. Sigen point, the north-west extremity of the bay, has a projecting reef, with 20 fathoms close-to. A patch of 4 fathoms lies about 5 miles southward of Benkunat bay, at 3 miles off shore.

Coast.—The coast here and farther to the southward is generally low, but inland the country is mountainous.

Between Bengkunat and Little Fortune island depths of from 10 to 20 fathoms will be found at 2 or 3 miles off shore.*

ISLANDS OFF THE WEST COAST OF SUMATRA.

General remarks.—A chain of islands extends parallel to the west coast of Sumatra at the distance of about 60 miles between the parallel of 3° N. and 2° S., covering a space nearly 700 miles in length. They are for the most part unsurveyed, and with the exception of a little recent information resulting from the visits of H.N.M. vessels of war, the account herein given is from old authorities.

PULO SIMALU† (**Pulo Babi**), the northernmost of the large islands, is about 53 miles in length, from 4 to 13 miles in breadth, and covered with vegetation. The north point is just southward of the parallel of 3° N.

The island is divided by a chain of mountains of which Gunong Sibahu and Gunong Sibihan attain a height of about 3,000 feet. The latter lies about 5 miles from the coast abreast pulo Kilik, that of Sibahu is situated at the narrow neck of the island abreast Tapak bay. There are no streams of any importance.

* For the description of Little Fortune island, and coast from Flat cape, *see*

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Inhabitants.—Trade.—The island is thinly populated, inhabitants, estimated at about 5,000, principally reside in s villages near the coast; besides these, about 600 Malays and Achi have settled there. Only the coast land is under cultivation; interior is wooded but there is comparatively little heavy timber

The trade is confined to that with Padang, and other coast ports, and carried on chiefly by a system of barter, the us coins having only just been introduced.

The principal productions are rattan, damar, gutta-percha, co cocoa-nuts, hides, scented woods, tortoise shell, buffaloes and goat

The islands around Simalu are of coral formation and uninhabited, though there are numbers of cocoa-nut and fruit tre

The coast is beset with numerous reefs many of which are doubt uncharted, requiring considerable care when navigating i it, and but few of the anchorages have been examined.

Sinabang bay*, westward of Tanjong Pulo, the east extreme pulo Simalu, is half a mile wide in the entrance and available about 2 miles of its length, at which distance up is the vill of the same name. It affords safe anchorage at all times depths of 15 to 19 fathoms, about one-third of a mile north-eas the village. The fairway to the anchorage is deep, but there several dangers on either side, requiring a careful look-out aloft.

Point Pulo, the east extreme of Simalu, is sharply defined coral reef extends a little distance off with a rock above water on hence its name.

Telok Tingi is the bay formed between point Pulo and Lent point; it affords anchorage in 13 fathoms off the village of the sa name.

A reef with less than 3 fathoms on it extends at least one mile the coast between Lentang and Tubah points. Foul ground discoloured water are reported to extend a considerable dista beyond this limit, rendering it advisable to give this coast a bertl about 4 miles.

Tapak bay† is situated on the west coast about 10 miles no west of Tubah point, and under mount Sibahu before referred It affords good anchorage off Lasikin village in about 10 fatho mud.

* *See* plan of Sinabang bay, on No. 2,284.

† *See* plan of Tapak bay, on No, 2,284.

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Reefs.—Lasikin point and southward to Pusang point is foul to the distance of half a mile. About 2 miles west-south-westward of Lasikin point, half way to pulo Tapak, is Centario reef, with a depth of 2 fathoms over it.

The flat islets of Tapak and Jut or Chut lie about 5 miles in the offing; a sunken reef also lies about midway between the south extreme of pulo Tapak and pulo Sevelak. The latter islet is wooded.

Directions.—From abreast and southward of pulo Tapak, steer for Pusung point, southward of Centario reef; pass about 3 cables westward of that point, and of the reef northward of it; this reef and Centario reef is usually marked by breakers.

Coast.—Deh reef lies a good mile westward of the west extreme of Tapak bay; a depth of 5 fathoms on its western side, is situated with the south extreme of Little Simalu bearing about W. by N., and Gunong Sibahu E. by N. northerly. About half a mile eastward of this depth there is much shallower water.

Little Simalu or Simalu Chut is a low island entirely surrounded by a coral reef, which extends farthest from its south-east side. It affords good anchorage on its north side in 11 fathoms, between the island and the main.*

Laru-u bay, abreast Little Simalu, affords good anchorage in about 6 fathoms, within the reef which extends 1½ miles from its western extreme, in a direction parallel to the east shore of the bay. A detached patch lies about midway between the south extreme of Little Simalu and Lambaja point, and others may exist; Lambaja point, has a reef extending southward, about half a mile apparently.

Reef.—A reef on which the sea breaks lies about 4 miles S.W. ¼ S. from the north-west extreme of Little Simalu. Reefs, the extent of which has not been determined, lie off the west coast of Simalu, between its north extreme and Little Simalau. A shallow reef is charted about 5 miles west of the north-extreme of the island.

The inhabitants carry on some trade in the produce of the cocoa nut.

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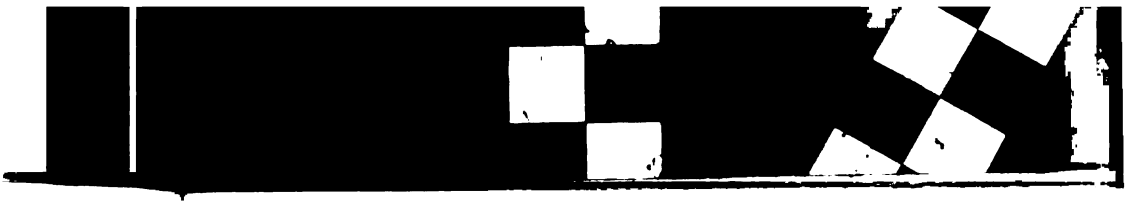
Overfalls.—On both sides of pulo Simalu there are sudden



One of these lies about 5 miles westward of the north point of t island, and 2 miles from the islets off that point, with a dep of 4 or 5 fathoms, or perhaps less water.

Off-lying islands.—Cocos islands, lying about 25 miles wes ward from the north point of pulo Simalu, are two small low islan 1½ miles apart, covered with trees, and visible from 12 to 15 mil A shoal is said to extend about 12 miles in a S.S.E. direction fro the islands, some parts of which are dangerous. In passing ea ward of the Cocos islands, the southern islet should not be broug northward of N.W. until distant at least 12 miles, and caution mu be exercised.

Pulo Siumat lies about 5 miles off the east side of pulo Simal and 13 miles from the east point. Jansen rock with a depth 2 fathoms and steep-to, lies with the north point of pulo Sium bearing W.S.W. distant 1½ miles. There are other islets along t shores of pulo Simalu, but so close in that it is difficult to distingui them from any distance. The channel between it and Simalu encumbered with reefs, and until surveyed, must be considere unnavigable.

Pulo Tapak or Flat islands, lie 14 miles south-eastward pulo Simalu; between them to within about 4 miles of pulo Simal there is a passage, in which no danger has yet been found. The islands are locally known as the Babi islands, the name bei incorrectly applied to pulo Simalu.

They are bold to approach, the north side being clear of dang beyond the distance of a cable.

Suffolk reef.—At about 5 miles eastward of the northern Tap is a coral reef of 4 or 5 fathoms seen by the ship *Suffolk*, from whi the north extreme of the north island bears W. by S., and the ea extreme of the south island S.S.W. There may be less water in vicinity. The passage between the Banjak islands and Suffolk re is considered clear.

The BANJAK ISLANDS are described at page 279.

PULO NIAS*, the largest of the islands off the west coast Sumatra, is 68 miles in length in a north-west and south-east directio and from 18 to 25 miles in breadth, separated from the Banj

* *See* Admiralty chart, No. 2,760.

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islands by pulo Nias north channel, 28 miles in breadth. It consists of ranges of hills attaining to 800 feet in height, with a fertile soil. It is subject to earthquakes, one of which (1843) swallowed up a hill and a village.

The island is thickly populated by an agricultural people who raise rice, cotton, and other useful products. They are estimated at 170,000.

The Malays, though small in number are the dominant race; they live on the shores, their chief place being Sitolie on the north-eastern side.

North shore.—At about 5 miles eastward of Tanjong Lebang the north-west point of pulo Nias, is a rock which breaks at about one mile off shore; it lies with Tanjong Tanah Nasie S.S.E. distant 1½ miles.

Lapau bay affords shelter from northerly winds, under pulo Panjang. Shallow water extends about 2 cables eastward of that island.

Pulo Babi lies in the North channel, at about 11 miles north-north-eastward of Tanjong Lojang, the north point of Nias island. The reef fringing it extends 9 cables in a north-west direction, 2 cables north and 3 cables southward. A sunken rock is said to lie 5 miles north-eastward of pulo Babi.

Siaba bay, eastward of the north point of pulo Nias, has a small harbour on its western side, about a cable wide between the shoals extending from its entrance points, and depths of 5 to 7 fathoms within, southward of Siaba village.

A shoal about 2 cables in extent lies about 4 cables seaward of the entrance; its best channel is northward of it.*

West shore.—Pulo Bunga, consisting of two islands, is situated about 13 miles southward of the north-west point of pulo Nias. A reef extends about 1½ miles north-west of the North islet, and detached reefs are charted between the north island and the shore northward of it.

Naku islands.—Anchorage.—The Naku islands extend about 10 miles off the west coast of pulo Nias. The channel between Langu and Mangit is partly blocked by the islet surrounded by shallow

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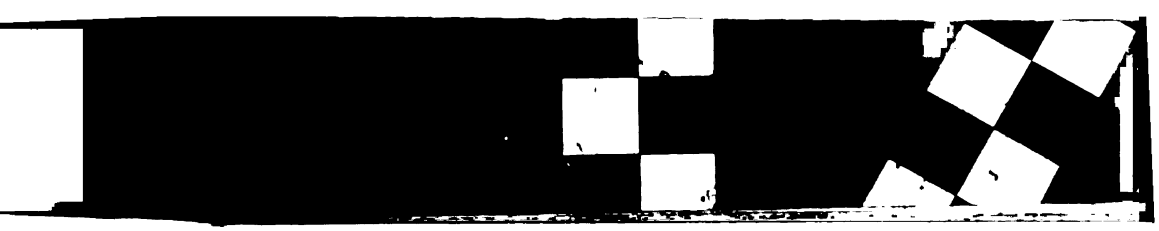

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lies about 3 cables off the east end of Simanang. The wi
entrance to the anchorage is apparently that from the southw
between Sendrongan and Mangit, with depths of 20 fathoms or m
Numerous sandbanks are said to lie to the westward of Naku islar
rendering it advisable to secure the services of a native pilot,
one can be obtained.*

The anchorage between Naku, Sendrongan, and Mangit, is abo
1½ miles in length by one mile in breadth, with depths of 15
20 fathoms, mud and sand, within a short distance of the shore a
well sheltered from the sea. A good position is about 3 cab
southward of Naku village flagstaff.

Aztec rock, on which the British barque *Aztec* is said to ha
struck in 1879, in 16 feet water, is reported to lie in lat. 0° 55′ N
long. 96° 48′ E., or about 29 miles westward of the north islet of t
Naku group. Breakers are charted about 20 miles south-eastward
Aztec rock.

Merapi bank, one mile in diameter, with depths of fro
6 to 8 fathoms, lies between Bunga and Naku islets, with the ea
point of pulo Bunga bearing N.W. about 11 miles.

Other dangers lie eastward and south-eastward of the Naku grou
for which a good look-out should be kept.

Serombu bay lies about 7 miles north-eastward of the Nal
group. Anchorage will be found here in about 10 fathoms o
Serombu river, with Ujong Serombu bearing N.W. There are tw
shoals near pulo Siite which must be avoided when approachi
this anchorage from the southward. Also northward of Ujo
Serombu lies a large shoal; the point should not be approache
from the northward in a less depth than 10 fathoms. The bar
the river is dangerous at times.

Telok Luagundi and Dalam.†—At the south end of pul
Nias there are three bays named Telok Luagundi, Pohili, and Dalan

Luagundi has depths of 7 fathoms, but open to south-westerly wind
and therefore not a desirable anchorage. Dalam affords anchorag
in 12 fathoms, open to south-easterly winds only. The village o

* *See* plan of Naku anchorage, on No. 2,284.

† *See* plans of Luagundi and Dalam, on No. 2,284.

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Babalobelano lies within its north-west shore, and is probably the place referred to in former editions where there is good anchorage, and that bullocks, buffalo, seals, poultry and water are plentiful.

Thornhill bank the least known depth on which is 18 fathoms, and steep-to, lies about 8 miles southward of pulo Nias, with the hill near Somo Somo, bearing about N.W. ½ W.. and distant 15 miles.

The east coast of pulo Nias has moderate depths, with good anchorage, and some rivers, where trade is carried on in native craft; islets and reefs front the coast here, as on the western side ; but the sea being more smooth on the eastern coast renders it safer. A shoal of 7 fathoms, reported by the *Valk* in 1888, lies with Majinga point N.N.W. ¾ W. distant about 2 miles.

Pulo Samasama, a small island, lies 2 miles off the river of the same name, at the east extreme of Pulo Nias, off which there is anchorage ; there are also other places where a vessel might anchor occasionally.

Pulo Sumbawa lies 7 miles south-south-eastward of Sama Sama, southward of which are the Macassar reefs, some of which break at times ; they should be given a wide berth.

Pulo Nias great channel lies between pulo Nias and the Batu islands, and is about 37 miles across. This channel is safe with a good look-out, but the prudent navigator will be cautious when near any of the islands during the night, as the dangers are but imperfectly known.

BATU ISLANDS.—The Batu islands are but little frequented, but a trade in dammer (gum) and other forest products is carried on by coasters from Padang.

Herzog Bernard, a small island discovered by the Netherlands war vessel of that name, in her passage from Padang to Acheh in 1874, lies in lat. 0° 2′ S. long. 97° 36′ E. on the western approach to pulo Nias Great channel. It is about 1½ miles in length north and south, low and covered with bush. It may be considered the westernmost of the Batu group.

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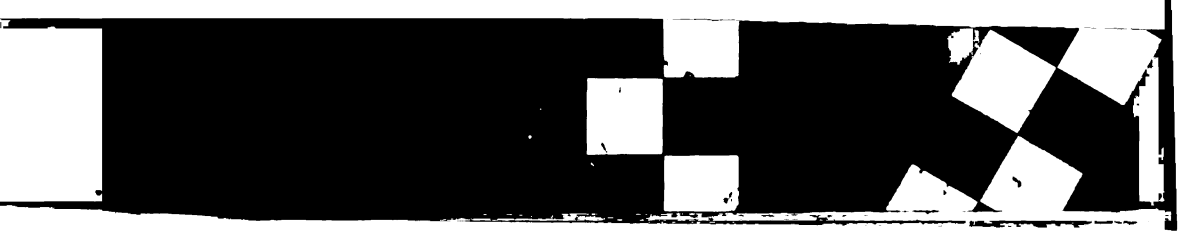

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1½ miles south-westward of the west extreme. The other sides the island are apparently clear of danger beyond a short distance.

Tanah Masa, or Batu island, the central and largest of the B group, lies about 40 miles south-eastward of pulo Nias, and forms south side of pulo Nias Great channel. It is 25 miles in leng north and south, and 5 miles in breadth. This, like the other la islands, is moderately elevated and hilly, covered with trees, a many small islands line its shores both on the east and west sid with moderate depths among them, and forming safe bays harbours, but little known to Europeans.

Tanah Masa with its adjacent islands extends north and sou nearly 45 miles, fronted by a chain of about twenty isles of vario sizes, some of them 13 or 14 miles distant from the main island, wi dangerous reefs which are steep to.

Anchorages on east coast.—There is anchorage close off t north shore of Tanah Masa, and also in the bay close westward Batuwawa point, its bluff north-east extreme, but exposed to t north-westerly monsoon. A few supplies may be obtained here, b no water. Also, on the east coast, about 3 miles south-eastward Batuwawa point there is anchorage in 10 fathoms good holdi ground, close southward of a small islet lying near the shore. The is a watering creek just southward of it.

Pulo Lago, situated about 3 miles off Batuwawa point appea to be encircled by reefs which stretch nearly to the shore of Tana Masa.

Lance or Lams bay lies about 8 miles south-eastward of Batuwaw point, and is formed by two islands near the shore ; a reef extend about one-third of a mile off the northern islet. The anchorag here is in about 16 fathoms, sand and shells, nearly midway betwee the islets, with the north extreme of the outer islet about S.E. by S A few supplies may be gathered here.

These anchorages on the east side are probably only suitabl for small craft, but the least depth reported is 7 fathoms, avoidin patches, and the best track appears to be about half a mile distan from Tanah Masa.

West coast.—Tello.—About 1½ miles south-westward of th north-west extreme of Tanah Masa is the island of Tello, wit anchorage in 8 to 12 fathoms, open to northerly winds, at about

See chart, No. 2,760.

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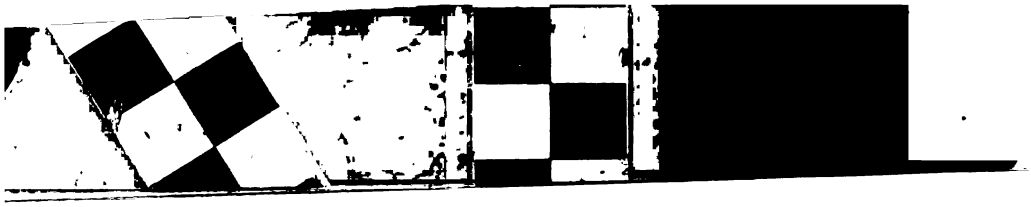

quarter of a mile off the Controller's house flagstaff at Tello village. *See* the dangers on plan.*

Pulo Pinie lies 9 miles north-eastward of the north end of Tanah Masa, nearly midway between it and the main; it is of considerable extent, stretching nearly 20 miles east and west, and having islets and shoals extending off in nearly all directions for a distance of 7 or 8 miles. Those on the north-east and south-east sides have been referred to at page 292.

Southward of pulo Pinie and nearly midway in the channel between it and Tanah Masa, is a reef on which the Netherlands-India S.S. *Graaf van Bijlandt* struck in 1885; it is reported to lie about 2½ miles southward of Pasakie islands, with Pasakie Besar bearing N. by E., and Pasakie Kechil N.N.W. ¾ W. As other shoals yet uncharted are reported to exist in this channel, caution must be exercised when navigating it.

Tanah Balah is the southern large islet of the Batu group. It is thickly wooded, attains a height of from 600 to 700 feet, and forms the north side of Siberut strait.

Doubtful reef.—High rollers were observed by the Netherlands-India s.s. *Governeur-General Myer* in 1895, westward of Tanah Balah in approximately, lat. 0° 19½′ S., long. 98° 13′ E., or with the north point of Makoli island bearing N.E. by E. ¾ E. about 10 miles.

SIBERUT STRAIT, between Tanah Balah and Siberut island is 26 miles wide, and the passage usually taken by steam vessels running between Acheh and Batavia *viâ* Padang. Sailing vessels have hitherto chosen the Seaflower channel, southward of Siberut island, said to be free from danger, but in which there is no anchorage ground. Since the survey of Siberut strait in 1877, and the establishment of a light on pulo Bojo, as well as the safe anchorage afforded in the southern portion of the strait, most vessels will find it to their advantage to use it in preference to any other.†

LIGHT.—On pulo Bojo, from a white lighthouse 197 feet high, erected on the south-west side of the island, is exhibited at an elevation of 361 feet above the sea, a *flashing white* light showing *two flashes* in quick succession *every half minute*, visible in clear

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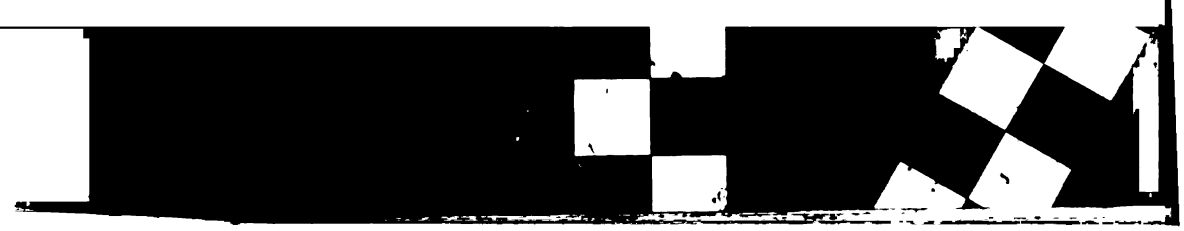

Tides.—It is high water, full and change, in Siberut strait duri the north-west monsoon period at 7h. 30m., springs rise 2½ feet. (the north coast of Siberut, the flood runs E.N.E., at times from 2 3 knots, but is sometimes overcome and even reversed by the wester current which runs at this season. The ebb, increased by th current, is said to vary from 3 to 6 knots. On the east coast of Siberu the flood runs to the southward and the ebb to the northward.

Winds.—From November to May, when the N.W. monsoo prevails south of the equator, the weather is fine in Siberut strai with cool westerly winds. During the day the wind is mostly fres from N.W., shifting towards evening to S.W. and south. Over th coast of Sumatra ghtning with squally weather is seen toward night, but it does not extend off to Siberut. On that coast the north west monsoon is seldom felt northward of Kroé (5° S.) but lan and sea breezes prevail with fine weather, and sometimes rain a night.

Northern shore.—The south coast of Tanah Balah forms th north shore of Siberut strait. Its western extreme, Hatik point, i rocky, and has a remarkable clump of trees resembling a hillock With the exception of a rocky point to the eastward the coast i sandy, and no dangers are known to exist other than those abov water. In the bay, north-westward of pulo Bojo there is a roc above water from which a spit extends one cable to the eastward As this portion of the strait has not been properly surveyed, an the water is generally deep with a heavy swell breaking all alon this coast during the north-west monsoon period, it is better t keep the Siberut island shore.

Pulo Bojo, lying about 2 miles southward of Tanah Balah, is small sloping island, fringed by a reef to the distance of abou 3 cables ; there are depths of 30 fathoms between it and the ree extending 5 cables southward from Tanah Balah. *See* Light, page 324

Reefs.—Heavy breakers were reported in 1876, by the steam vessel *Marion*, on the east side of Tanah Balah, about 5 mile north-eastward of pulo Bojo, but the Dutch surveyors foun 117 fathoms near this position, and make no further mention of it.

Graaf reef, about one mile in extent, lies E. by N. ½ N. distan 10 miles from the south point of pulo Bojo. Patches of 6 and fathoms are charted in its vicinity ; there may be less water.

See chart. No. 2,760.

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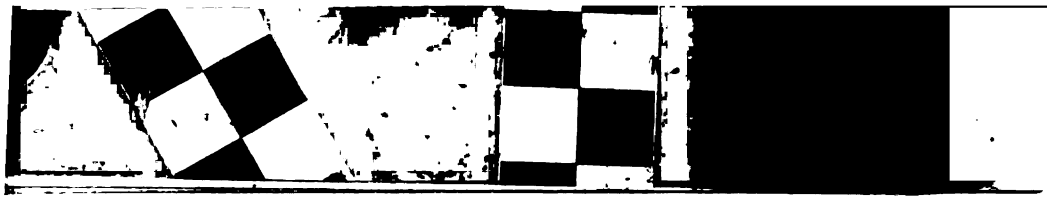

Southern shore—Anchorages.—The northern end of Siberut island, 15 miles in length in an east and west direction, forms the south side of Siberut strait. Ujong Behuden, the north-western extreme, is a rocky point, from which the coast trends eastward to Bumpyes point, a distance of 3 miles. Bumpyes is a double point with a conspicuous white rock on the western head visible from the northward at the distance of 7 miles; there is also a remarkable tree on it which is only seen from the eastward. With the exception of Bumpyes point the whole shore is sandy.

At about 4 miles eastward of Bumpyes point there are several patches with a least depth of 4 fathoms, at about one mile off shore; with this exception, which only affects heavy draught vessels, the shore may be safely approached for anchorage in from 10 to 20 fathoms, over a sandy bottom.

Silugui bay* lies close eastward of Ujong Sigeb, the north-east extreme of Siberut island. It has general depths of 18 to 25 fathoms, but a shoal about 3 cables in extent lies in the northern portion, with depths of one to 3 fathoms. The channel northward is about one cable wide and that southward is about 4 cables wide. Between the shoal and the reef fronting the western shore to the distance of 1½ cables, there is anchorage in from 18 to 25 fathoms.

There is anchorage under pulo Sigir to the southward of the bay, which may be approached by keeping close to the reef extending about half a mile south-east of that islet, to avoid shoal patches of 3 and 4 fathoms lying less than one mile south-east of it; and anchoring with the islet bearing N.N.E. distant about one mile, in 6 fathoms of water.

Macassar reef, of sand and coral, with a least depth of about 2 fathoms, is 2 miles in extent, and lies in the centre of the western entrance to Siberut strait, and on the north-west edge of the bank extending from Siberut island. This reef breaks occasionally with the swell, and in strong winds the breakers will be visible from about 4 miles distant.

From the reef, Ujong Behuden bears S. by E. ½ E., distant 11 miles; northward and westward of the reef there is no bottom at 60 fathoms.

A chain of coral shoals extend in a north-west direction, 14 miles from Ujong Sigeb, the north-east extreme of Siberut; between these

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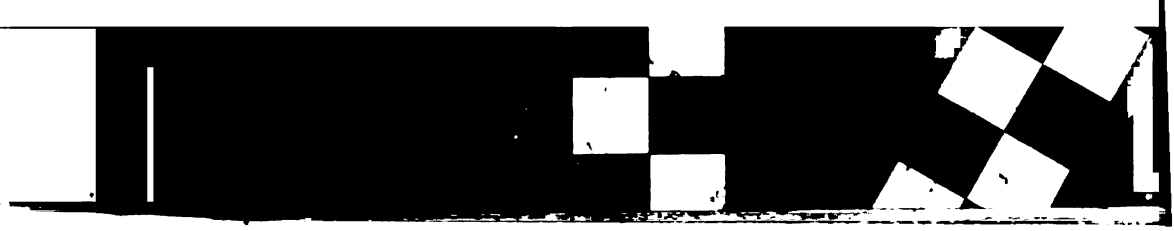

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water, are passages from 2 to 4 miles wide. The shallowest pa
3¾ fathoms, lies with Ujong Sigeb bearing S.E. ½ S. distant 6 mi
for others, *see* the chart.

Directions.—Vessels approaching Siberut strait from the w
ward will sight pulo Bojo, nearly 400 feet high, with its lightho
the light from which is visible about 27 miles. The best channe
that between pulo Bojo and Macassar reef, which is apparently cl
of all danger, and the reef is nearly always to be seen by the break
The island should be passed at the distance of 2 or 3 miles, steer
East, until Ujong Sigeb bears S.S.E., when course may be shaped
the desired port.

Or, passing southward of Macassar reef, the only known dang
are those on the eastern part of the bank, the least depth on which
3¾ fathoms at 6 miles off Siberut. Course may also be shaped alo
the north coast of Siberut island distant from 2 to 3 miles, passi
Ujong Sigeb the east point at about one mile, by this means t
patches are avoided. In this track, anchorage may be taken an
where in moderate depths, over sand, whilst northward of Macass
reef there is no anchorage; so that for sailing vessels possibly meeti
with light winds and an adverse tide, the southern track through t
strait is recommended.

MENTAWI ISLANDS.—Siberut island (Great Fortu
island of the Dutch) is 56 miles in length and from 15 to 24 mil
in breadth. It is inhabited by a race of Malays named Mentav
The north and a portion of the east coast of the island has be
described on p. 326.

Siberut island is high and wooded, with many sandy beaches alo
the coast, and on which there is usually a heavy surf breaking on t
western side.

Several small islands lie close to the coast on the eastern si
others interspersed with shoals lie off the south-west and sou
sides, the southernmost of the latter, named West island, is 10 mil
off shore. There is an intricate channel between the islets off t
south-west and south shores, with depths of from 16 to 20 fathom
but it is inadvisable to attempt it.

Tabekat bay* is situated on the east coast of Siberut, abo
9 miles southward of Ujong Sigeb. It lies within Carolina and An
islands, and affords sheltered anchorage in depths of 9 to 10 fathom

* *See* plan of Tabekat bay, on No. 2,284; also chart, No. 2,760.

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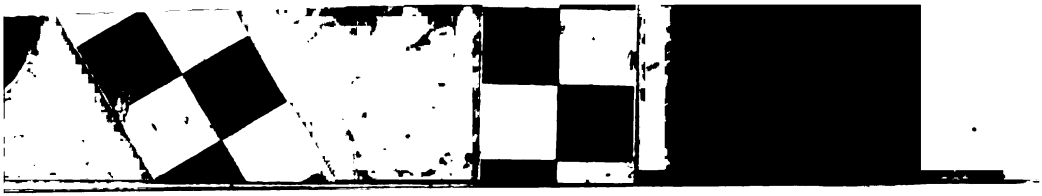

The channel between these islands is the deepest, that southward of Anna island has a depth of only 2 fathoms in one portion of it.*

Simalapah and Siberut bays are situated about 33 miles southward of Tabekat bay.*

The first mentioned affords anchorage in 8 to 13 fathoms, southward and south-eastward, respectively, of the south-west extreme of the long island occupying its northern portion, with secure anchorage in 7 to 10 fathoms within the island.

Siberut bay, with depths of 10 to 20 fathoms at a quarter of a mile off the village and flagstaff, is open to the northward and eastward.

Katorei bay† is situated at the south-east extreme of Siberut island, and its entrance has been surveyed. Selenna island, in its approach from the south-eastward, is in lat. 1° 47′ S., long. 99° 18′ E.

The west side of Siberut is unexplored.

Seaflower channel, formed between the islands off the south side of Siberut and Sipora, is named after H.M. brig *Seaflower*, Captain W. Owen, who passed through the channel in 1806, and who describes it to be clear of danger; no soundings were obtained at 30 fathoms in passing through.

As there is no anchorage ground in this channel, Siberut strait which has been partly surveyed, is to be preferred.‡

SIPORA (Sikabu), one of the Mentawi islands, forms the south side of Seaflower channel, and between cape Tilleru the north-east point, and cape Marlborough the south-point, is about 26 miles in length, and from 4 to 10 miles in breadth. The island is wooded and a little less elevated than Siberut.

A reef extends half a mile off the north-east end of Sipora, and westward towards Hurlock bay. Westward of the bearing of the east extreme of Syeitan island, N.W. ½ W., isolated reefs exist.

Hurlock bay,§ consisting of an outer and an inner bay, lies on the north side of Sipora, and directly south of the small islands which front the shore.

The outer bay has moderate depth for anchorage, with a soft

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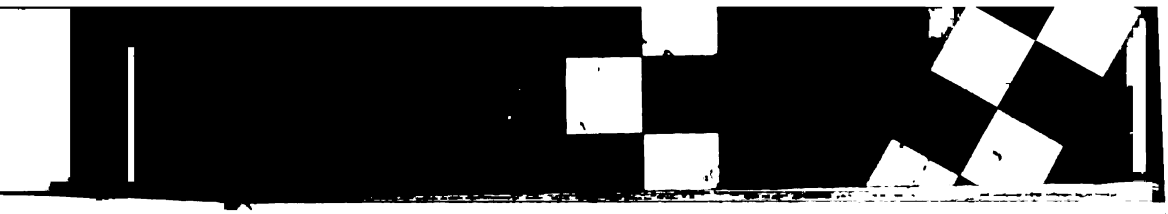

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mile in diameter, with an entrance about half a mile in width, depths of 4 to 7 fathoms. In entering the inner bay, the nort side of the channel should be kept, as a reef extends some dist from the south side of the entrance. There is shelter from all w in the northern part of the inner bay, in depths of 8 to 10 fath with 3 to 5 fathoms nearer the shore, which is a red sandy beach

The east coast of Sipora is generally steep, but rocks proje considerable way from the shore in some places, particularly to southward of a round peaked hill named Turks Cap; from abr of the Cap, soundings may be obtained along the coast towards c Marlborough, which is bluff, moderately elevated, and fronted rocks extending 1½ miles off shore.

Settlements.—On the east coast of Sipora are the follow streams on which there are settlements, viz., the Sjoreino at 2 mi northward of Siuban; Siuban in the bay of the same name; Saba 3 miles farther southward, and the Sikitji, 5 miles southward Siuban.

Weather.—The weather during July and August, when visit was variable, the wind usually south or south-east, varied by northe winds and heavy north-west squalls, which latter lasted only a f hours. During August the rainfall was heavy.

Supplies.—At these places a vessel may be supplied with wo water, a few hogs, yams, poultry, and cocoa-nuts, by the people the few straggling villages on the east side of the island.

Siuban bay* is about one mile in length, and half a mile in wid between the wooded entrance points, with depths of 20 to 30 fatho over a channel about 3 cables wide between the reefs extending fr those points. The bay may be recognised by the small conical h just northward of it, and by the white and conspicuous sandy bea known as Pasakiet bay at one mile in the same direction. The b anchorage is in the south-east part, with the south point of the entra bearing about N.E., in depths of from 8 to 14 fathoms. The p caution of sounding around the vessel should be taken, for in so parts there are patches of coral rock. There is a brook of fr water at the north-west part of the bay, and at about one hour's r up the river is the village of Siuban.

No. 866.
2,284.

See chart, No. 2,761.
* *See* sketch plan of Siuban bay on No. 866.

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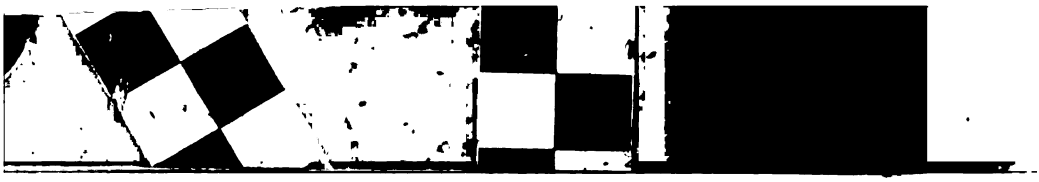

Tides.—It is high water, full and change, at about 6 hours, springs rise 4 feet. The flood stream sets southward and the ebb northward along the coast.

Seme bay* may be known by the Turks Cap hill to the southward, and by the small coral island of Seme, with one or more trees lying near its centre. The bay is about one mile wide with depths of 13 to 16 fathoms over the greater portion of it. Southward of the island the bottom is mud, and suitable for anchorage in depths of from 10 to 20 fathoms. A good position, in 15 fathoms, is with the east point of the bay E. ¼ N. and the islet N. by W. ½ W. The bay is uninhabited.

The West coast of Sipora, is rocky with some small islands adjoining, and the sea breaks high upon the shore. Two of these islands, about 12 miles to the westward of cape Marlborough, lie close to the shore, and near each other; they are low and flat, covered with cocoa-nut trees, and rocky to seaward.

SIPORA STRAIT.—The channel between the south end of Sipora and North Pagi island is about 12 miles in breadth, and considered to be safe. The islands are said to be connected by a coral ridge of from 20 to 40 fathoms; on this ridge, which lies with Turks Cap in line with cape Marlborough, bearing N.W. by N., and at about 3 or 4 miles from Sipora, there is a bank of about 7 fathoms water, which should be avoided as less water may exist.

The English vessel *Dunleep Singh* (1884) found depths of 22 fathoms, rapidly decreasing to 13 and 7½ fathoms, with the bottom plainly visible, but the actual positions of these soundings were not given.

PAGI ISLANDS are together about 55 miles in length, separated by Sikakap strait. Both the islands are high, covered with large trees, and may be seen in clear weather about 40 miles. The inhabitants are said to be simple and inoffensive. Cocoa-nuts and sago palm are cultivated.

NORTH PAGI is about 20 miles in length by 15 miles in breadth.

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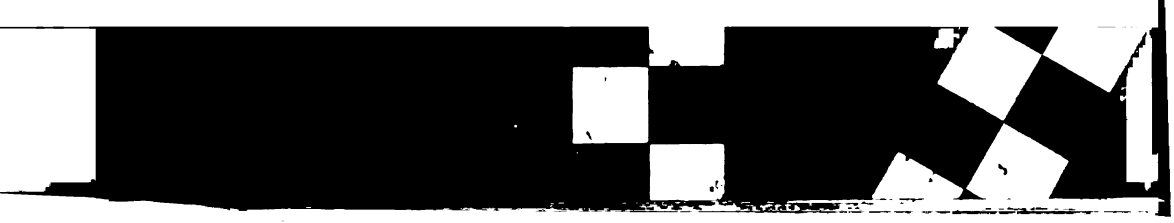
See chart, No. 2,761.



Simenaju road,* situated near the north-east extreme of N Pagi island, is an open anchorage, with depths of 5 to 6 fath mud, at about a quarter of a mile off the islet. In the north pa the road the village lies abreast the islet.

Silabulabu bay.†—On the west coast of North Pagi ther a group of islands, with a channel on either side of Montrado isla the northernmost, leads to an anchorage between it and the m where vessels may anchor in from 5 to 10 fathoms, sheltered f all winds. Northward of Makassar island there is anchorage i fathoms sheltered from southerly winds, whilst south-westwar that island there is shelter from northerly winds. The best chann the anchorage is northward of Montrado island, avoiding the extending some distance off it.

Silabulabu village is situated on the side of a rivulet at the so east side of the bay, where water may be procured.

Batu Mongo bay and village lies southward of Silabulabu b from thence to the south-west entrance of Sikakap strait the coas rocky, upon which the sea breaks heavily.

Sikakap strait,‡ separating the Pagi islands, is about 7 mile length in a north-east and south-west direction, and apparently than half a mile in breadth in its narrowest part, with water suffic apparently for most vessels, but it has not been properly surveye

The passage from the south-westward is between pulo Ti Nu and the Siopa islets, by keeping in mid-channel, and thence w ward of pulo Mashuchu and Bakot Pegu, where the depths are fr 5 to 15 fathoms. There is a rock in the channel eastward of latter islet, and a few others near the shore of South Pagi. P Tongo in the eastern entrance is nearly joined by reefs to South P island, the channel, therefore, is northward of Tongo, where water is deep. The tidal streams run as much as 3 knots at tir but there is anchorage out of its force in small bays on either s and where the depths are regular.

Pulo Ti Nussa, at the south end of the strait, is separated fr North Pagi by a channel, with from 5 to 10 feet water, front which there is a small island, having a rock upon it resemblin thatched house when viewed from the south-westward. The

* *See* plan of Simenaju road on chart, No. 2,761.

† *See* plan of Silabulabu on chart, No. 2,761.

‡ *See* plan of Sikakap strait on chart, No. 2,761.

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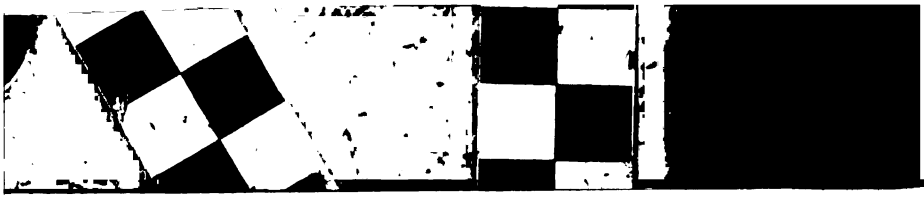

breaks with great violence upon the rock, and upon the low rocky shore to the westward.

Sikakap river, on the western shore, where fresh water may be procured, is opposite the north-west point of South Pagi; the village of that name is several miles up the river; there is also fresh water under the high land at the south-east point of North Pagi.

The trees in Sikakap strait are suitable for spars; they are also cut into planks by the natives for the Padang and Benkulen markets.

SOUTH PAGI or SOUTH NASSAU ISLAND is about 38 miles in length by 10 miles in breadth, with several small islands near the western and south-east sides. The west coast of Pagi islands, in several places where the land is low, abounds with cocoa-nuts; some small spots have been planted with pepper vines.

Labuan Jau road is an open anchorage with depths of 12 to 13 fathoms at about 3 cables off shore. It lies in about lat. 3° 4′ S., long. 100°29′ E.*

A large reef lies about 3 miles off shore.

Vekens bay,† on the south-east side of South Pagi, lies within Tinopo island, which fronts its entrance; it is about 6 miles in length by from one to 3 miles in breadth, and is the only sheltered anchorage on the east coast of South Pagi. The northern entrance has charted depths of 11 to 13 fathoms and is about three-quarters of a mile wide. The southern entrance shows no soundings.

There is anchorage in about 15 fathoms at about half a mile off the centre of the west coast of Tinopo island, and towards the head of the bay westward of Neumann island, in about 10 fathoms, mud. For the dangers in it see the plan.

Maes island, one of the numerous islands in the bay, is in about lat. 3° 7′ S., long. 100° 26′ E.

Between this bay and the east point of South Pagi, temporary anchorage may be taken off some of the small villages, where the depths appear to be moderate.

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Tides.—The tide among the Sipora and Pagi islands rises from

Suman and Mongo islands, are situated 2 and 5 miles respe tively south-eastward of the south entrance to Vekens bay. Mong is high, and a reef lies 1¾ miles south-eastward of it.

SANDION ISLAND lies 14 miles south-eastward of Sout Pagi, and is low. A small round island, with trees, lies close to th east side of Sandion, on the reef which surrounds that island to th distance of one mile.

A coral bank lies westward of Sandion, on which the *Europa* (in 1797), steering E.S.E. to pass southward of Sandion, obtaine soundings in 33 fathoms, soon shoaling to 4 fathoms; she the hauled off S.W. and deepened in half an hour to 65 fathoms, n bottom. When in 4 fathoms, the east point of Sandion bore E. by N about 9 miles distant.

The *David Scott*, in 1825, found 25 fathoms, hard bottom, with th centre of Sandion bearing N.W. ½ N., distant 10 miles; being nearly calm, a boat was sent to sound a distance of 2 or 3 cables from th vessel, and she found the same depth. As other coral spots may probably exist in the vicinity of Sandion, it seems prudent to give this island a good berth on all sides. The channel between Sandion and South Pagi is reported safe.

TRIESTE ISLAND, or Pulo Mega, situated in about lat. 4° S., long. 101° E., is 3 miles in length, surrounded by a reef, and is visible from a distance of about 15 miles in clear weather. A coral bank of 25 to 30 fathoms stretches 3 or 4 miles off the north, east, and west sides of the island, on which a sailing vessel may anchor, if drifted near by the current during calm weather; some fresh water may be got upon the island in the rainy season. (*See* p. 16.)

ENGANO (Telandyang), the southernmost of the large islands fronting the west coast of Sumatra, and distant from it 58 miles, is 19 miles in length and about 10 miles in breadth; it has a level appearance, is about 1,060 feet in height, and may be seen about 22 miles distant in clear weather. The shore generally is rocky and bold, fronted by ledges on which the sea breaks, rendering landing impossible in many places. Black rock, 8 feet high, lies about one mile off Kenemei, the south point.

Depths of 23 fathoms, rocky bottom, have been reported at 6 miles southward of the island, with shoaler water nearer the shore.

See chart No. 2,761.

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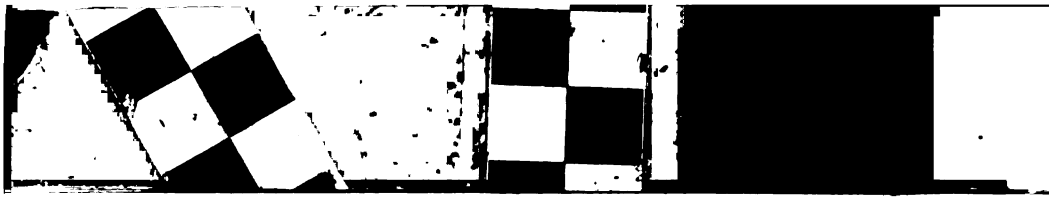

The existence of this shallow water is somewhat doubtful, but as no soundings are shown on the chart it is advisable to give its assigned position a wide berth. The north side is clear.

Engano bay,* on the east side of the island has in its entrance three small islands surrounded by reefs; the bay affords anchorage over sandy bottom and shelter from most winds.

North island is covered with trees, and, excepting a small opening on the west side, is surrounded by a coral reef of considerable extent, partly dry at low water, but having depths of 4 to 7 fathoms close-to.

South island, distant 1½ miles from North island, is also covered with trees, and surrounded by a reef, which on the western side extends but a short distance. There is a narrow passage apparently between South island reef and the reef which extends one mile south-eastward of Kowabi point.

Middle island is conspicuous from the sea, having a high sandy beach, with a tuft of trees on the centre. It is situated on the outer detached reef which lies off the north-east point of the head of the bay, with apparently no passage between; the reef extends about a quarter of a mile eastward of Middle island.

Middle island is in about lat. 5° 28′ S., long. 102° 22′ E. Sandy islet, on the old plan, has apparently disappeared; it is probably on the submerged reef westward of Middle island.

Directions.—Most of the following remarks are gathered from the chart and must be used with considerable caution. The channel apparently now used is that northward of North island, abreast which, on Engano, is the settlement.

The approach has depths of 8 to 12 fathoms, with anchorage in about 15 fathoms, marked by a buoy, with the west point of North island bearing S.S.E. ½ E., distant half a mile. A cross beacon of wood marks the north end of North island reef, but neither it nor the buoy must be depended on.

The channel leading into Engano bay between North and South islands, has depths of about 12 fathoms coral in mid-channel; thence avoiding South and Middle island reefs, anchorage may be taken north-westward of South island in from 9 to 18 fathoms; or pro-

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ceeding beyond towards the head of the bay, along the south shore

if requisite. A vessel may anchor in from 4 to 6 fathoms, sand an mud, about one mile off the head of the bay, keeping nearest th south shore, which has in most places a sandy beach, bold to approacl the trees growing quite into the water in some parts.

Patches of 3¼ and 3½ fathoms are charted south-westward of Nort island.

Settlement.—The settlement on Engano is abreast North island Here is the residence of the Dutch magistrate in charge.

Supplies.—At the head of the bay there is a small stream of fresl water, and there is or was a village near it. The island abounds witl good timber, fish, yams, and cocoa-nuts.

Mails.—The mail steamer from Batavia to the west coast o Sumatra ports calls here once every three months. (*See* p. 8.)

Landing is difficult in most parts of the bay.

Barhao anchorage.—A little westward of the north point o Engano island is the anchorage of Barhao, a narrow inlet in the fringing reef, extending east and west nearly 8 cables, and having in mid-channel a depth of 6 to 8 fathoms, except near the head where there are shallow patches.*

Kahek or Satu.—On the west side of Engano, in a small bay between Kahek island and the coast, there is anchorage in abou 10 fathoms with the south extreme of the island about West, distant 3 cables. The passage between the island and the point of the bay is 4 cables wide, but the reefs extending from both shores reduce it to about 2 cables, with depths of 5 to 6 fathoms on either side of a 2-fathoms patch in the fairway. The east shore of the bay is fronted by a reef to the distance of 2 cables.

* *See* plan of Barhao anchorage on chart, No. 2,761.

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CHAPTER VI.

SUNDA STRAIT AND ITS APPROACHES, WITH THE OUTLYING ISLANDS.

VARIATION IN 1896.

Sunda strait ... ... 1° 40′ E.

THE KEELING OR COCOS ISLANDS.—General remarks.—The Keeling islands are situated about 600 miles in a south-westerly direction from Java head, nearly in the direct route of vessels *viâ* the cape of Good Hope. They are in two distinct divisions, lying north and south of each other, having a channel between them about 15 miles wide.*

These islands were discovered in 1608 by Captain William Keeling, in the service of the East India Company, but were little known previous to the visit of Captain J. Clunies Ross, of the ship *Borneo*, who partially refitted his ship here in 1825.

Captain Ross returned to the islands in 1827 with some Scotch colonists, but found them occupied by Alexander Hare, who, with a large number of Malay followers, had arrived the same year. The two factions lived on bad terms with each other, and many of Ross' colonists left the place owing to its being already occupied, but eventually the Ross' influence became the stronger, and Hare, deserted by his followers, left the islands. The Ross family now own the islands. In 1836 the Keelings were visited by Captain Robert Fitzroy, who surveyed the group, the chart of which appears to be still correct in its main features, but the head of the lagoon is shoaling.

In 1857 Captain Stephen G. Freemantle, in H.M.S. *Juno*, visited the Keelings, and formally annexed them to the British Crown. In 1878 the islands were placed under the government of Ceylon, and

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Position.—The west point of Direction island, at the north-ea extreme of South Keeling, is in about lat. 12° 5′ S., long. abou 96° 53′ E.

South Keeling.—The northern division consists of one islan only, whilst the southern division or South Keeling, numberin about 20, form a roughly broken circle nearly approaching the horse shoe shape common to coral atolls. The two largest islands of thi southern group, named Selima and Ross, are about 6 miles in length and lie on the south-east and south-west sides of the group. New Selima, on which is the settlement, composed of the Cocos or Malay village, and also the Bantam village, lies on the north-east side of the group. Direction and Horsburgh are the northern islands, between which is the channel to port Refuge, available for vessels of about 20 feet draught of water.

Outside and nearly all round the group a natural barrier protects the lagoon, rendering it perfectly smooth over the greater portion of it. Seaward of this barrier, on which the sea breaks continually, there is a sudden slope into deep water. The greater portion of the lagoon, which is 9 miles in length by about 6 miles in width, is filled with patches of growing coral, having deep water between, but it is only navigable by boats.

The land is evidently rising, and at some distant time will form a circular island, surrounded by a crater-like edge; at present the land is nowhere more than 20 feet above the sea. The tops of the cocoa-nut trees, with which the whole of the islands are covered, may be seen from a distance of about 16 miles in clear weather.

Population.—In 1892, when H.M.S. *Plover* visited the islands, the population numbered 574—Cocos-born 389, Bantamese 185. In 1894 the population was 580 (H.M.S. *Peacock*).

Trade.—Supplies.—The exports are now entirely confined to copra, which commands a higher price than is usually obtained for that produced elsewhere, amounting in value to about £22,000 annually. During 1894, 634 tons were exported to Holland. The imports are provisions of all kinds, clothes, cutlery, guns, and most other necessaries of life.

Poultry is plentiful on the islands, and the lagoon abounds with fish. On Direction island are some deer, and there are a few sheep on Settlement island, but they do not thrive here; jungle fowl are

See chart, No. 2,510.

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found on most of the large islands. There are a few fruit trees, such as bananas, papaws, guavas, and figs; pumpkins grow plentifully, but other vegetables are to be obtained only in small quantities. Water is plentiful, and can be put on board at a charge of 10 shillings per ton. A vessel of 178 tons has been built on the island.

Pier.—A new pier 600 feet in length, and carrying a light steel tramway, has been built westward of New Selima island, just southward of the Bantam village.

Communication.—Produce for the European market is called for once a year by a chartered vessel. Produce for Batavia is sent once a month by the family schooner, which returns with the necessary supplies for the islanders. It is visited occasionally by one of H.M. ships.

Port Refuge, in the northern portion of the lagoon, affords good shelter from the sea for vessels of about 20 feet draught, in depths of from 4 to 5 fathoms, with the northern extreme of Direction island bearing E.N.E. With good daylight and a look-out aloft to point out the shoals, vessels may go nearer the settlement, but it is stated that from the growth of weed the deep water is not so easily discernible as formerly; a pilot will come off to take the vessel in if the usual signal be hoisted.

There is good anchorage in 7 to 9 fathoms, coral and sandy bottom, good holding ground, with the extremes of Direction island bearing E. by N. $\frac{1}{4}$ N. and N. by E. $\frac{3}{4}$ E. A second anchor should be always in readiness to let go. During the few days' visit of H.M.S. *Peacock*, in June 1894, it was generally blowing hard from S.E. with squalls of wind and rain. Lower yards and topmasts were sent down, but the vessel did not drag.

The entrance is from the northward, between Direction and Horsburgh islands; no bottom will be found with the hand lead until on the line joining these islands. It will be seen on the plan that a narrow spit extends about 7 cables S.W. by W. from the southwest extreme of Direction island, with a patch of $2\frac{1}{2}$ fathoms at that distance; there is said to be less water in places on it than is charted.

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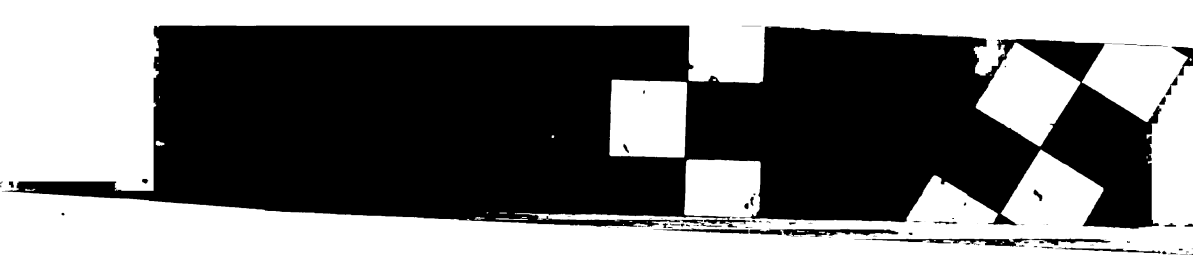

Tides.—It is high water, full and change, at 5h. 30m.; ri
tide about 5 feet, the flood stream setting into the harbour at the
of 1½ miles an hour. The current running past the islands t
north-westward, about 18 miles per day, is increased by the
stream; with the ebb tide the current is counteracted, and ther
little or no stream.

Winds.—Weather.—The S.E. trade prevails for about 300 d
in the year, varying between south and east, and being stron
about August. The months of June, July, and August are
coolest and healthiest, the fresh or strong breezes being accompan
by frequent rains with occasional squalls. September, October,
November are dry months, and the least healthy.

Between November and February, the greater portion of
cyclone period, the trade is less steady, being interrupted by cal
storms, and variable northerly and westerly winds; and fine days
followed by ugly weather, thunder and lightning, with violent gu
of wind and heavy showers, causing much anxiety.

The weather experienced in March, April, and May is much t
same as that of September to November, but not so dry.

Cyclones.—The Keelings are not entirely free from cyclones;
March, 1861, one was experienced; a second, in 1863, devastated th
islands. Another in January, 1876, accompanied by a tidal wav
destroyed the store houses, engine house and mills, and most of th
dwellings, the corrugated roofs of some of them being carried awa
by the wind for several miles; a slight earthquake accompanied i
causing a black fluid to arise in the southern portion of the lagoon
and which, overspreading it, destroyed nearly all the fish and corals
A cyclone was experienced on 4th February, 1894, when a grea
number of cocoa-nut trees were destroyed.

Climate.—The climate of the Cocos Keeling islands is exceedingly
healthy during the greater portion of the year, more especially
during the months of May to September, when it is said to resemble
the climate of Southern Europe in the summer months.

Previous to the introduction of the disease beri-beri, which is
reported to have died out, sickness was rarely known, but during the
dry season, September to November, cases of it occur, and diarrhœa
is prevalent; and in a less degree in the months of March to May.

See chart, No. 2,510.

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An epidemic of influenza was experienced in 1894, causing several deaths.

Temperature.—June to September, when the trade is strongest, is naturally the coolest season; the temperature then varies from 78° to 80°, occasionally reaching 82°, the night temperature being 73° to 74°.

The hottest months are from December to March, when the trade is less regular; the temperature then ranges from 83° to 85°, occasionally reaching 88° to 89°, the night temperature being 76° to 77°; the temperature during the remaining months is between these.

The hot close nights, usually experienced in the tropics, are few.

During the strong trade wind the air is pleasantly dry, there being a difference of 6° to 8° between the wet and dry bulbs; even in the opposite season there is usually a difference of 2° to 3°.

The average height of the barometer is 29·90 inches, varying one-tenth on either side; but during storms or passing cyclones it may fall an inch or more.

The rainfall does not probably exceed 40 inches, spread over about 100 days; between April and September it occurs as passing showers, which often take place at night; between November and April it is heavier and more frequent, affording a lasting supply to the wells.

North Keeling, situated 15 miles northward of the South Keeling group, is one low island lying on a reef about one mile in diameter. The island is a strip of low coral surrounding a lagoon and thickly covered with cocoa-nut trees. There is a small break in the island on the eastern side, but the passage is not available for entering the lagoon. The only landing is on the west side of the island, and is not always practicable on account of the surf.

A spit is said to extend about one mile northward of the island, and heavy rollers at times rise suddenly off the south point, making it dangerous to approach. A bank is reported to extend for a distance of 5 miles S.S.W. of the island, and also for 3 miles to the eastward.

CHRISTMAS ISLAND.*—General remarks.—Christmas island, situated about 220 miles southward of Java head, lies nearly

in the track of sailing vessels proceeding to Sunda strait from Cape of Good Hope in the months of April to September, and a from Sunda strait in the opposite or north-west monsoon period.

The island, of limestone formation, densely wooded and steep-to about 11 miles in length, in a north-east and south-west direction attains a height near its western end of 1,195 feet, and near its easte end 1,100 feet, and in clear weather may be seen from a distance 30 miles or more.

It is quadrangular in shape, the north, south, and east sid being each about 9 miles in length, and the west 4 miles. Se from the northward or southward, it is saddle shaped, the midd of the island being considerably lower than the east and we portions. The slope from the coast cliffs to the hills is gradual most places, but here and there perpendicular cliffs of limeston crop up. Towards the summit the patches of cliff become fewer an the soil richer. Three of these cliff terraces were met with i the ascent to the summit from the landing near North-west point.

The sea face of the island is composed of perpendicular and almos continuous cliffs, about 30 feet high, much underworn in places rendering the island inaccessible, except where in a few places th cliff has crumbled away and formed a rough beach of fragmentary rocks, on which, when it is the lee side, landing may at times be effected. Except in Flying Fish cove the depths at one cable or less off-shore are about 100 fathoms, affording no anchorage. Depths of about 1,000 fathoms are found from 2 to 3 miles off-shore; the bottom off the east side is of a volcanic nature. The south and east sides were not approachable by the boats of the *Flying Fish*, being at that time the weather shores.

No large animals were seen on the islands; rats of two species, a shrew mouse, and three kinds of lizards were found; large crabs were plentiful, and appeared to be equally at home scrambling over the sea cliffs or climbing the trees. Gannets and other sea birds visit the island in the breeding season. Pigeons were fairly plentiful. The flora is similar to that of the Celebes; iron-wood trees, sago palms and pandanus were in abundance. Some of the trees measured 300 feet in height. No running water was found, but it being the rainy season at the time of the visit of the *Flying Fish*, water had collected in the holes in the rocks. *See* Settlement, p. 342.

In June 1888, Captain W. H. May, R.N., in H.M.S. *Imperieuse*,

See chart, No. 941*a*.

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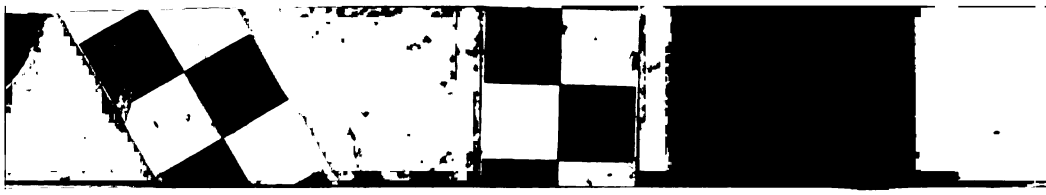

visited Christmas island, and formally annexed it to the British Crown. It is occasionally visited by one of H.M. ships.

Flying Fish cove.—The north side of Christmas island, between North-west and North (Rocky) point, forms a curve about 2 miles in depth, in the eastern corner of which is a bight, now named Flying Fish cove, about half a mile in breadth and 2 cables in depth, in which temporary anchorage may be taken with off-shore winds on the coral ledge which fronts the cove to the distance of one cable. Here the *Flying Fish* anchored in 22 fathoms, and the *Egeria* in 30 fathoms (stern in 4½ fathoms), smooth water, with a stern hawser to a tree within a few yards of the beach, to prevent the anchor slipping off the ledge into deep water. The bottom is rocky in these anchoring depths, with growing coral, but between them and the shore there is a belt of white sand nearly clear of rock.

The schooner belonging to the Ross family, which visits the island occasionally, anchors on the point of the reef, northward of the settlement.

The observation spot at the landing in Flying Fish cove, is in lat. 10° 25′ 19″ S., long. 105° 42′ 57″ E.

Landing was effected at the head of Flying Fish cove, on the coral boulder beach (about 20 yards in width) without difficulty, the water being perfectly smooth; also on a similar beach 2 miles eastward of North-west point. At this latter beach, the party from the *Egeria* found a narrow sandy channel about 80 feet in length, which led through the fringing reef, directly to the shore, where landing was easily effected. Recent reports state that landing is difficult from December to April on account of heavy swell, not from wind.

The only visible sign of the island ever having been visited before 1887, were two nearly illegible initials on one of the trees at the cove.

Tides.—It is high water, full and change, at Christmas island, at 7h. 20m., springs rise from 4 to 5 feet.

Winds.—South-east winds prevail all the year round, but in the month of March a few days' westerly winds occur. There is no rainy season, but rain falls nearly every night.

Settlement.—A party of twenty, under the command of A. F. C. Ross, from the Keeling islands, settled in Flying Fish cove, in November 1888, and there were 20 there in 1893. There had been no sickness of any kind. A dozen huts have been built at the head of the cove, and three wells, 35 feet deep, from which good water

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is obtained, have been sunk close-to. Cultivation is progress favourably; coffee, cocoa, tamarind, guava and the mango tree flour whilst vegetables and bananas grow in abundance.

But little dependence is placed on fishing as a food supp probably owing to to the fact that during the westerly monsoon boat can safely be launched. The young black frigate bird is said be excellent eating.

SUNDA STRAIT.

GENERAL DESCRIPTION.*—Sunda strait, through whi passes a large portion of the trade of China, as also most of the tra of Batavia, Singapore, and other ports in the Java and China se separates the large islands of Java and Sumatra. Its western entranc between Java head and cape Rada, is 58 miles wide, in a north-we and south-east direction; and from the western to the eastern limit the strait, which lies between St. Nicolas point and the opposite coa of Sumatra, the distance is 70 miles; the general direction of th track for shipping being about N.E. and S.W. The narrowest part the strait is about 13 miles wide, abreast Fourth point, and is divide into two channels, each about 4 miles wide, by Thwartway island.

In the strait are several islands forming different channels, b which it may be entered from the westward; but Princes channe and Great channel, both on the south side, are those most commonl used.

The Great channel is limited on the north side by the conspicuou Krakatoa island, between which and the coast of Sumatra are thre channels, formed by Sebesi and Sebuku islands, all now ver dangerous and to be avoided.

VOLCANIC ERUPTION.—The volcano of Krakatoa islan was in eruption in the year 1680, and although included within th category of active volcanoes it remained in a state of comparative in activity for upwards of 200 years.

On May 20th, 1883, the volcano burst into eruption, accompanie by earthquakes, which were severely felt at Batavia, and at the same time vast showers of pummice and ashes were projecte to a great distance. This eruption was observed from the Imperia German ship *Elizabeth*, and on the following day, when 100 mile from Krakatoa, a shower of dust was experienced which wa estimated to become a layer one inch in thickness in 24 hours and dust was observed to be still falling when the vessel had gained a position 300 miles south-west of Sunda strait.

* *See* chart of Sunda strait, No. 2,056.

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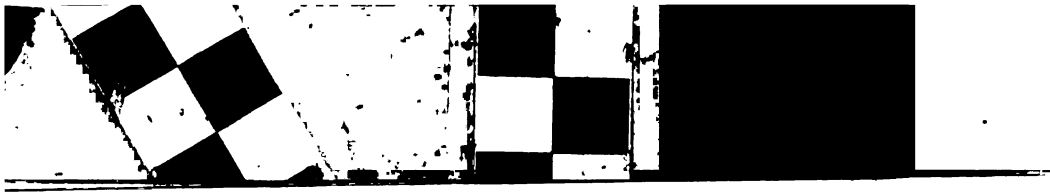

On 26th August 1883, Krakatoa again burst into eruption, and of such a terrible nature that miles of coast on both sides of the strait were wholly devastated, and multitudes of people perished. On the 27th August, a succession of earthquake waves swept the shores of the strait, utterly destroying the towns of Anjer, Merak, Charingin and Telok Betung, together with some of the lighthouses on both shores. This remarkable disturbance of the sea made itself felt in various parts of the world upon the same date, notably in Australia and Southern Africa, also at Karachi in India.

The vast amount of pummice which lay upon the surface of the sea, in some places many feet in thickness, gave an appearance as if the ocean bed had appeared above water.

The changes in the locality, resulting from the eruption, are partly defined by surveys executed by the Netherlands Government surveying vessel *Hydrograaf*, 1883–85, but it is advisable to take every precaution when navigating near the shore, or coming to an anchor.

Winds.—In Sunda strait the wind varies from S.S.E. to E.S.E. during the south-east monsoon, April to October ; and from W.N.W. to N.W. in the north-west monsoon, with intervals of calm. *See* also p. 24.

In the northern approach to Sunda strait, during the south-east monsoon period, a north-east wind will sometimes blow for weeks, usually in the forenoon, rendering it advisable for sailing vessels to anchor under the Java shore when the tidal stream is adverse.

Tides.—Currents.—In Sunda strait, it is high water, full and change, during the north-west monsoon, at 6 h. ; springs rise 3 feet. The flood sets north-eastward and the ebb south-westward with a rate at springs of 3½ knots, but it should be observed that the tidal streams are much influenced by the prevailing winds outside the strait, so that as a consequence the set of the stream is mainly south-westward during the greater part of the year.

On the east side of the strait during the south-easterly monsoon (April to October), the ebb often runs to the south-westward for about 14 hours at the rate of one to 2 knots, increasing in strength to 3½ knots abreast Thwartway island ; then changes and sets north-

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On the west side of the strait during the south-east monsoon, there is an almost constant current setting to the south-westward, and there is seldom any flood stream apparent. During the north-west monsoon when the wind is strong, flood and ebb streams run, but the flood ha not much strength, and southward and westward of the Zutphen islands there is a constant current to the southward and south-west ward at the rate of 2 to 3 knots an hour; it has been known to run as much as 4 knots in February and March.

Directions.—*See* pp. 347, 356 and 373.

SUNDA STRAIT.—SOUTHERN SHORE.—Java head the western extremity of Java, is a bluff promontory at the foo of high land, and is discernible at a considerable distance in clea weather. (*See* light on First point, p. 348.)

When making it in hazy weather, the appearance of the land to th eastward of cape Sangian Sira, between it and Sodong point, bear much resemblance to the high land of the west point of Java, wit the adjacent hills on Princes island; and the low land in suc circumstances not being distinguishable at a distance, the positio of it has been in former times often mistaken for the entrance t Princes channel.

Cape Sangian Sira.—From Java head the coast trends south ward for about 5 miles to cape Sangian Sira the south-west extrem of Java. From this cape, and 1½ miles to the southward, severa rocks project, some of which are above water. The depths ar considerable close to these rocks, and along the shore as far as Jav head there is no bottom with 100 fathoms; but as the breakers whic line the whole coast seem to indicate that there are rocks under wate it will be advisable to give the shore a berth of at least 2 miles.*

Mount Payung, 1,575 feet in height, rises over cape Sangia Sira.

Kelapa island, called pulo Deli by the Malays, lies 8 miles fro the nearest shore of Java, and about 18 miles S.E. by E. ½ E. fro cape Sangian Sira. It is low, covered with tall trees (those alon the beach being cocoa-nut), and is surrounded by a reef, which i many places stretches off a distance of one mile. On the north-we side there is a good watering place in the south-east monsoon, an boats can enter a stream through a channel with reefs on both side

* *See* sketch on chart, No. 2,056.

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Vessels may anchor in 18 to 24 fathoms, clay bottom, 2 miles from the island, close to the reefs which partially dry at low water. The depths are from 30 to 40 fathoms at 4 miles off the south coast of the island.

PRINCES ISLAND, or pulo Panaitan, separated from the west end of Java by Princes channel, is 12 miles in length by about 8 miles in breadth. It is of an irregular form, projecting to a point on the north-east side, and having a large bay on the south-west side, the horns of which form the west and south points of the island. The middle and eastern parts of the island are hilly, the highest peak, mount Rakso, 1,450 feet above the level of the sea, being on the eastern side; but in some parts, particularly at the west end, the land is level and low fronting the sea; all parts of the island are wooded.

A fringe of reef extends from Parut point, the north-east extreme of the island, and along the shore on each side. A similar fringe extends about a third of a mile off Semadang point, the south-east point of the island, and a coral reef on which the sea always breaks lies half a mile off the point westward of it. The fringing reef continues along the shore to the south point enclosing the conspicuous White rock.

Carpenter rocks.—The south and west extremes of Princes island are fronted by the Carpenter and Princes reefs, respectively, to the distance of about one mile. Most of the Carpenter rocks are above water, and the sea is usually breaking over them. The reef which fringes the north-west and north sides of the island is steep-to.

Kasuaris bay, on the south-west side of the island, is 4 miles deep, and has at its entrance depths varying from 30 to 50 fathoms, decreasing within to a convenient depth for anchoring; but being open to all winds between west and south, it is not frequented, and cannot be recommended.

PRINCES CHANNEL, between Carpenter rocks off the south end of Princes island, and Friar rocks off First point of Java, is 3 miles wide, and possesses the great advantage of affording anchorage to sailing vessels when becalmed, which Great channel does not.

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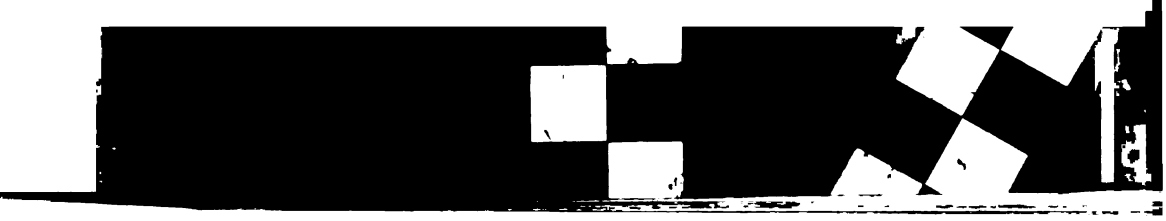

to Sunda strait, occurring even in the strength of the south-east monsoon, and vessels when not able to anchor are liable to be set back by adverse currents.

The depths in this channel are much greater on the Princes island than on the Java shore. Near to Carpenter rocks there is no bottom at 50 fathoms; towards Mew bay, on the Java shore, the depths decrease to 20 fathoms and less.

Directions.—In the south-east monsoon, when proceeding either way through Princes channel keep closer to the Java coast than to Princes island.

In the north-west monsoon, it often happens that vessels bound out of the strait get quickly to the westward by proceeding through Princes channel, while those using Great channel are detained by heavy squalls and adverse currents. Indeed, instances have occurred in which vessels have worked through this passage in a remarkably short time during a westerly gale, by carrying a heavy press of sail, and tacking between the squalls, when it was impossible for any vessel in Great channel to beat against the current and heavy sea.

Proceeding through Princes channel in this monsoon, keep near Princes island and Carpenter rocks, especially when working out against westerly winds, for a current will then sometimes be found setting to the westward. It is, moreover, very important to keep close to Carpenter rocks when working out, to avoid being set by the heavy swell upon the rocks near Java head; for being once outside anchoring ground, and in a calm, a sailing vessel would have much trouble to clear the coast of Java. The south-east coast of Princes island must not, however, be approached within one mile.

GREAT CHANNEL lies between the north point of Princes island and the south point of Krakatoa island, which are 23 miles apart; and although too deep for anchorage, it is much frequented, being the widest passage into the strait, and is considered to be clear of danger. As far as at present ascertained, the eruption of Krakatoa has not affected the navigation of this channel. If the strait be entered by this channel, keep Princes island aboard, and when farther in the strait keep on the Java side.

JAVA COAST.—First point.—The coast between Java head and First point is fronted by high rocks stretching out a considerable distance in some places. First point, the south point of entrance

See chart, No. 2,056.

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to Princes channel, has a conspicuous rock lying abreast of it, which rises abruptly out of the sea, and is steep-to. Close to the northward of First point there is another rock above water, which together with the former are named Friar rocks. About a mile eastward of First point, and close in-shore, is the Mewstone, a small rock above water.

LIGHT.—From a white stone lighthouse, 160 feet high, erected on First point, is exhibited, at an elevation of 260 feet above high water, a *flashing white* light *every half minute*, each flash being of *six seconds* duration, followed by an eclipse of *twenty-four seconds*. The light is visible between the bearing of N. 19° W., through east, to the land at Sinini point (except where obscured by Princes island), and should be visible in clear weather from a distance of 23 miles.

Mew island, or pulo Kanti, lying about 2 miles eastward from First point, is nearly 2 miles in length by one mile in breadth, hilly, and wooded. The shore is rocky on the seaward sides of Mew island, but safe to approach, the depths decreasing gradually to 8 or 9 fathoms.

Between Mew island and the main there is a narrow but safe channel with depths from 5 to 10 fathoms, sandy bottom. When taking this passage, keep close over towards Mew island, to avoid Watson bank, which lies near the Java shore. Sometimes the sea breaks upon this bank.

Anchorage.—Water.—To the eastward of Mew island, on the Java coast, there is a good watering place in the south-east monsoon; the water is excellent, and falls in a cataract upon the beach. Large boats may approach this spot at high water through a narrow channel in the reef, and fill the casks by a hose.

A little to the northward of the watering place, and about half a mile from the coast, lies a coral reef about a cable in extent, with one fathom least water, and 5 to 6 fathoms around it. A vessel standing in for the watering place must steer between this reef and the island, and anchor in 9 or 10 fathoms.

In the south-east monsoon there is also good anchorage a little farther out, in 16 to 19 fathoms, sandy bottom, with the north point of Mew island bearing about W. ½ S., and the east point S. by W.

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Tides.—It is high water, full and change, at Mew bay at about 6h.

Second point consists of a low foreland, somewhat broad in appearance, situated about 12 miles north-eastward from First point. It may be approached without danger to the distance of one mile, and in from 26 to 20 fathoms water, the reefs projecting but a short distance off shore.

Between Mew island and Second point, reefs project half a cable from the shore, having from 5 to 6 fathoms water close-to, which increases rapidly to 10 and 20 fathoms; with due attention to the lead, a vessel may approach the shore in order to anchor. Sometimes native craft may be met, having turtle, fowls, and cocoa-nuts for sale.

WELKOMST BAY.—At a distance of 20 miles north-eastward of Second point is Third point, and between is a deep bight, named Welkomst bay, which affords good shelter in the south-east monsoon, but should be avoided in the north-west monsoon. There is, however, said to be good anchorage in the north-west monsoon, when the wind is not too northerly, south-eastward of Second point, in 9 to 10 fathoms water; but this anchorage should be approached with caution, as the soundings decrease suddenly to 2 fathoms on the edge of the reef which fronts the shore between Second and Tembing points. The bay has not been surveyed.

The West shore of the bay trends southward for 11 miles from Second point; about the middle the coast forms a bight, with a depth of 4 fathoms at its entrance, but only one fathom a short distance within. The whole of this side of the bay is skirted by reefs.

A large portion of the bay within Panter and Rocky ridge reefs has not been examined, but it is supposed to contain several shoals.

Andelan and Little Andelan are two islets lying near the south-west shore of the bay, about 8 miles from Second point. Three sandbanks, each surrounded by a sunken reef, lie from half to three-quarters of a mile off the eastern islands. Between these banks and Andelan the depths are from 4 to 6 fathoms, mud; and between that island and the shore from three-quarters to $1\frac{3}{4}$ fathoms.

The distance across from the southern shore of Welkomst bay to the south coast of Java is about one mile, and the sound of the surf on the south coast may be distinctly heard across the isthmus.

See chart, No. 2,056.

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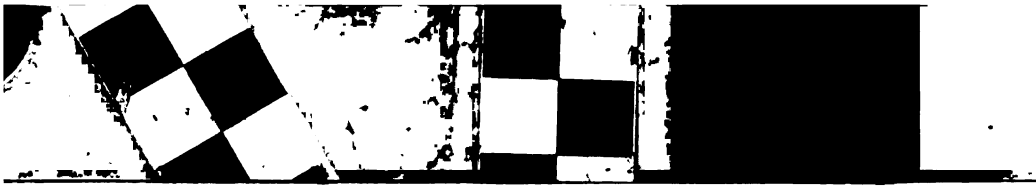

The East shore of the bay northward of Badui islet has general depths of 15 to 24 fathoms at some little distance from it, with several islets and dangers. Southward of Badui islet are many coral rocks, for the most part dry at low water, with depths of 7 to 9 fathoms between them.

A large coral rock above water, usually covered with a heavy surf, lies about 1½ miles westward from Badui islet, and near it appear to be other reefs.

About 5 miles north-eastward of Badui islet is Palagan point, with some islands off it, the southernmost of which is named Mangir, and the others Uwar, Umang, and Sumur. These islands, as well as Palagan point, are surrounded by reefs, a cable in breadth, but at one mile seaward there are depths of 15 fathoms, mud.

Mount Honjeg, 2,044 feet high, lies abreast Badui islet, and about 2½ miles inland.

Rocky ridge is about 100 yards in length, partly above water, and always marked by breakers, by which it may be distinguished at some distance. It lies about half way between the western shore of the bay and Panter reefs, with depths of 10 to 12 fathoms around it.

Panter reefs are the outermost of the known dangers in Welkomst bay, and they lie nearly midway between Second point and Palagan point. They consist of four different patches, the whole being from half to three-quarters of a mile in extent. The shoalest patch has a depth of about one fathom, rock, but around them are 9 to 10 fathoms, mud.

THIRD POINT, like Second point, is very low, although sharper, and fronted by rocks to the distance of 2 cables, from which the depths increase to 10 and 18 fathoms.

Batu Hidueng, a hill situated 4 miles southward of Third point, is 900 feet in height, and possibly easily recognised.

PEPER BAY.—Pepoli island lies about 11 miles north-eastward from Third point, and between is Peper bay. Its shores are fronted by reefs which near the points project about half a mile, increasing their distance from the shore towards the depth of the bay, where they extend 1½ miles. The bay has also two reefs known as Coral

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uniformly from 14 to 4 fathoms; the latter depth will be found 2 miles off shore. In the easterly monsoon there is safe anchorage north-east of Lawungan islet, in 6 or 8 fathoms, soft bottom.

Coral bank lies nearly 2 miles eastward from Third point and is about 3 cables in length, the greater part being above water.

Lawungan islet, situated at the head of Peper bay, is about three-quarters of a mile in length by a quarter of a mile in breadth, and surrounded by a reef which projects 1½ cables from the north side of the islet.

Three-quarters of a mile to the north-westward and westward of Lawungan islet are two reefs, partly dry at low water, and usually breaking.

To the southward, and in mid-channel between Lawungan islet and the shore, is a reef with 3 feet water, between which and the island there are depths of 3 to 4 fathoms.

Panjang reef, off Pepoli island, is one mile in length, half a mile in breadth, with a least depth of 3 feet. This reef, being steep-to, is dangerous, as the sea does not often break upon it; but by keeping a good look-out it may be distinguished by the light colour of the water, and its brown patches.

The COAST.—Pepoli island, small, round, and about half a mile in diameter, lies within one mile of the shore, with which it is connected by a reef; there is, however, a channel of 1½ fathoms through this reef available for boats.

Kebua reef, about half a mile in extent, lying 2 miles north of Pepoli island, and two-thirds of a mile off the shore near Charingin, is of coral, partly above water, generally breaks, and is steep-to.

Anchorage.—A convenient anchorage in 7 fathoms, clay, will be found to the northward of Kebua reef, at 1½ miles off shore, with Pepoli island bearing S. by E.

The Coast from Charingin trends nearly north, and may be approached to a depth of 12 to 15 fathoms. Its appearance is low, though occasionally interrupted by hills and rocky points.

Catherine rock, lying about 4 miles to the southward of Fourth point, and half a mile off shore, is about 2½ cables in extent, with

See chart, No. 2,056.

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two rocky heads above water near the centre, and which are visible about 3 miles. A small patch of 3 fathoms lies 3 cables N.N.W. of Catherine rock, with 6 fathoms between. The coast should not be approached to a less depth than 12 fathoms.

Telegraph cable.—The shore end of the submarine telegraph cable, from Kalianda in Sumatra, is now landed at a cable house situated southward of Catherine rock, and 5 miles southward of Fourth point.

FOURTH POINT, distant nearly 27 miles north-eastward from Third point is low, but easily discerned from its numerous cocoa-nut trees. A reef fringes the shore to the distance of 1½ cables.

LIGHT.—On Fourth point stands an iron lighthouse, painted white, 190 feet high, from which is exhibited at an elevation of 180 feet above high water a *fixed white* light, visible in clear weather from a distance of 20 miles.

Anjer.—Signal station.—The settlement at Fourth point (formerly known as Bojong) has been named Anjer, and a post office, signal and semaphore stations have been established. Vessels will be signalled free of charge to Batavia.

Water.—Drinking water free of charge is obtainable from a reservoir near the Bojong river.

Anjer peak, 1,936 feet in height, is situated about 4 miles within Fourth point.

Old Anjer, situated 2½ miles north-eastward of Fourth point, was destroyed by the earthquake and tidal wave in 1883; but a new native settlement has been formed near its site which furnishes supplies as stated below.

Anjer river, close westward of this settlement, is 40 yards in breadth, with a depth of 3 to 6 feet at low water, and affords good landing for boats in the easterly monsoon; but the Paku river, situated half a mile to the northward, and which has a least depth of 2 fathoms, is to be preferred. The Paku is about 80 yards wide, and has some rocks near the entrance, which may be avoided by keeping close over to the reef extending from the south point. During the easterly monsoon, small craft will find anchorage in 4 to 5 fathoms within the entrance avoiding patches of 2 fathoms

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Anchorage.—There is anchorage in Anjer road in 14 fathoms, fair holding ground, with Fourth point bearing S.W. ¼ S.; and the summit of Thwartway N.W. ¼ N. at half a mile from the shore reef; from thence the depths decrease uniformly to 8 fathoms at about a cable from the reef which fringes the shore. This is but an indifferent roadstead in the north-west monsoon, and landing is then dangerous on account of the high surf. Sailing vessels have frequently found themselves in dangerous proximity to this reef from anchoring in too little depth of water, and with no room to veer in the event of sudden and violent squalls, which, as in most tropical countries, are common in this strait.

Supplies, &c.—In the south-east monsoon period, vessels, both outward and homeward bound, occasionally call at Anjer for supplies. Buffaloes, poultry, vegetables, fruit, hogs, sheep, turtle, and water (*see* p. 352) are to be procured. Native craft from Anjer, with supplies, may be met with in Sunda strait, and even as far northward as the Brothers.

THWARTWAY ISLAND, or Pulo Sangian, 505 feet high, lying in the middle of the narrowest part of Sunda strait, is easily recognised by its irregular shape. From the north-eastward or south-westward, the island appears as five islets, the earthquake wave having swept through it, destroying all the trees in the low ground and valleys, but there is no change in the contour of the island, or in the depths around. It is 2¼ miles in length in a north and south direction, and steep-to on its northern and eastern sides beyond one cable distance. Off its southern extremity a reef projects about 3 cables, on which is a rock above water; off the reef are depths of 13 fathoms.

The west side of the island forms a bay, in which there is temporary anchorage in 13 fathoms, sand, with the extremes of the island N. ¾ W. and S.E. by E. ½ E. The usual south-westerly set in Sunda strait causes strong eddies in this bay.

Brabands island, 150 feet in height, and about a cable in diameter, lies about 4 miles south-eastward from Thwartway island.

A shoal of 2 fathoms lies 2 cables off the coast of Java, with Brabands island bearing N.W. by W.

See chart, No. 2,056.

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Browers sand is the name given to the two patches of 4½ and 5 fathoms, situated near the south-west end of the tongue of sand extending about 3 miles in that direction from Merak island, at 1½ miles off the coast of Java.* Between these patches and Merak island there is convenient anchorage for vessels working through Sunda strait.

Krunjo rock, which dries at low water, lies about 2 cables off the coast of Java abreast Browers sand.

The depths close to the west side of Browers sand are from 10 to 15 fathoms, increasing to 19 and 20 fathoms at the distance of one mile. When standing towards the shore, keep without the line joining Fourth point and Brabands island.

MERAK ISLAND, near the Java coast, is 220 feet in height, nearly round, and about half a mile in diameter. Within it is New Anjer road.

A **patch** of coral, with a depth of 4½ fathoms, and steep-to nearly all round, lies with Merak island bearing about S. ¼ E., and distant 1¼ miles. When the current is running from one to 2 miles an hour, the patch is marked by ripples, and sometimes by discoloured water.

Little Merak island lies near the shore, about half a mile south-eastward of Merak island.

NEW ANJER ROAD,† nearly half a mile in extent, is situated between Merak islands and the main coast of Java.

New Anjer.—The settlement of New Anjer was formed here when Old Anjer was destroyed by the earthquake. It has since been transferred to Fourth point. A few native huts alone remain of New Anjer.

Tarrembu bank, nearly 2 cables in extent, lies in the south entrance to the road, midway between Merak islands. On its north-western part is a patch nearly a cable in extent, with a rock which dries. A patch of 3¼ fathoms lies half a cable northward of this rock; and a bank of 4 to 4¾ fathoms lies 1½ cables north-north-eastward of the rock.

* Browers sand, previous to the earthquake, had in one place a depth of only 1½ fathoms, with a general depth of 3½ to 4 fathoms.

† *See* plan of New Anjer road on chart of Sunda strait, No. 2,056.

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Anchorage.—The anchorage with south-west winds, is northward of Tarrembu bank and other patches, in from 8 to 10 fathoms, with the northern hill of Merak island bearing West. It is not considered safe for large vessels in the north-west monsoon, as a heavy swell sometimes sets into it, but small vessels will always find shelter under Merak island.

Directions.—The channel into the road north of Merak is the one recommended; it is more than a cable in breadth, and has depths of 7 to 10 fathoms. In entering, keep Merak island aboard. Steam vessels may enter the harbour by the south channel, on either side of Tarrembu bank, as there are depths of from 5 to 8 fathoms water in both, but it is not practicable for sailing vessels, as there is always a strong adverse current.

ST. NICOLAS POINT.—The coast from Merak island trends in a north-easterly direction about 5 miles to the perpendicular point, St. Nicolas, the extreme end of the bold promontory (of which mount Gedeh, 1,968 feet in height, is the summit), forming the north-west end of Java island. Dangers extend about a third of a mile off St. Nicolas point, with 11 fathoms close-to.

About midway between St. Nicolas and Merak island is Tamposo islet, near the edge of the reef fringing the coast which extends about a third of a mile off; close to this reef are depths of 10 to 15 fathoms. The shore should not be approached to a less depth than 18 fathoms, unless seeking anchorage when the wind and current are unfavourable; good anchorage will be found in the bays along this shore, in from 8 to 10 fathoms.

LIGHT.—Babi island light, situated about 15 miles eastward of Nicolas point, may possibly be sighted by vessels passing through Sunda strait, when within 6 miles northward of that point. It is a *fixed white* light, visible 13 miles in clear weather between the bearings of S. 81° E., through north, to N. 88° W. *See* Eastern Archipelago, Part II.

Toppers (Button) island, about one cable in diameter, is 230 feet high, steep, and covered with trees. It lies well out in the fairway of Sunda strait, 5 miles north-eastward of Thwartway island, and has 15 fathoms close off its south end, and from 30 to 40 fathoms at a short distance all round.

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Stroom rocks lie in the fairway of Sunda strait, westward of Thwartway island, N.W. by N. about 1½ miles distant from that island, with some heads just above high water. They are steep-to, and at times the breakers over them may be seen at a considerable distance.

A rock is charted about half a mile south-east from Stroom rocks.

The current or stream in the vicinity of these dangers, when opposed to the wind, cause such strong eddies as to make it almost appear as if Stroom rocks were connected with Thwartway.

Winsor rock, marked by tide rips, has a least depth of 14 feet, with other rocks close to, beyond which the depths increase suddenly to 20 and 30 fathoms in all directions. From the rock the summit of Toppers island bears E.S.E., about 1½ miles.

General Directions.—Steam vessels and sailing vessels, with a steady and commanding breeze, entering Sunda strait, from a position about 2 miles off Third point, may steer to pass about the same distance off Fourth point; thence westward of Brabands island, taking care not to borrow too close on Browers sand in passing, observing that Fourth point open westward of Brabands island leads westward of it.

The winds, however, frequently become light and variable, and a sailing vessel may be compelled to anchor, in which case it is better to keep well in with the coast of Java, avoiding the dangers in Peper bay, which should not be approached under a depth of 14 fathoms.

When the stream is running to the westward in the middle of Sunda strait, an eddy will be experienced near the land; besides which a vessel may anchor anywhere along the shore, except near Fourth point, where the bottom is in places foul and rocky. When working to the north-east, therefore, it is advisable not to keep too far in the offing, in order to make the eddy available, and not to lose favourable anchoring ground, and perhaps be compelled to anchor in deep water. For working to the westward, *see* p. 374.

When northward of Toppers island, if bound to Banka strait, steer for the fairway between the Two Brothers and the North Watcher; *directions continued on p.* 390. If bound to Batavia, pass St. Nicolas point at the distance of 2 miles, and shape course to pass midway between Babi island and Pontang point, and to the entrance of Inner or Dutch channel, the one most frequented by vessels entering Batavia road from the westward. *See* Eastern Archipelago, Part II.

See chart, No. 2,056.

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SUNDA STRAIT.—NORTHERN SHORE.—The South Coast of Sumatra, forms the north shore of Sunda strait, and between Flat cape on the west and Hog point on the east, a distance of 70 miles, is indented by two large bays, named Semangka or Keizer, and Lampong, the shores of which are fronted by numerous islands and rocks.

FLAT CAPE, or Vlakke Hoek, is the south-west extremity of Sumatra and of the district of Benkulen ; the peninsula of which it is the western extremity separates Keizer bay, on the east side, from Belimbing bay on the west side. Its southern coast is low and wooded, and its east extreme, named cape Rada, is distant 10 miles from Flat cape.

The Sawah range of mountains terminate at cape Rada.

Approaching Flat point, in thick weather, when the land cannot be seen, it is not advisable to get into less than 20 fathoms.

A reef fringes the shore of Flat cape and thence to cape Rada, but at one mile distant there are depths of 7 to 10 fathoms.

Seleman rock, on which the sea breaks, has a less depth than 3 fathoms, and lies with Seleman point bearing W. by N. ½ N., distant 1¾ miles.

Sandbank.—At about 3 miles south-westward of Flat cape there is a bank of reddish sand, with depths of 8 to 9 fathoms, about 2 miles in length and one mile in breadth. The depths seaward of this bank increase rapidly to 30 and 50 fathoms, and within it there are depths of 12 to 14 fathoms. At about 4 miles westward of Flat cape a doubtful bank of 5 fathoms is charted.

LIGHT.—From an iron tower 215 feet in height, with white dwelling, near the extremity of Flat cape, is exhibited, at an elevation of 205 feet above high water, a *group flashing white* light, visible seaward, between the bearings of S. 42° E. and N. 84° W., (except where obscured by Little Fortune island between the bearings of S. 73° E. and S. 76° E.), from a distance of 21 miles. It shows in quick succession *three flashes*, each of *two seconds duration*, separated by *three seconds* of darkness, and followed by an eclipse of *eighteen seconds*.

See chart, No. 2,056.

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BELIMBING BAY* lies northward of Flat cape. Vessels may anchor in 6 fathoms, and find a good berth with south-east winds at one mile northward of Flat cape, and the same distance off the village. Small vessels will be fairly sheltered from most winds by anchoring within the reef projecting from Flat cape.

A shoal of $3\frac{3}{4}$ fathoms, with 7 to 10 fathoms around, lies with the south point of the bay bearing S.S.E. $\frac{1}{2}$ E., distant $1\frac{7}{8}$ miles; a patch which breaks occasionally lies with the same point bearing S.E. by S. about 3 miles.

Water.—A well of good water lies within the south point of Belimbing bay.

Little Fortune island, or Batu Kechil, lies W. by N. $\frac{1}{2}$ N., distant 9 miles from Flat cape, and about 5 miles from the main; it is low, wooded, one mile in diameter, and surrounded by a reef extending one mile in places. There is anchorage off the east side of Little Fortune island in from 9 to 10 fathoms.

SEMANGKA or KEIZER BAY,† on the eastern side of the peninsula and of the Sawah mountains, forming the south-west extreme of Sumatra, extends in a north-westerly direction about 30 miles, and at its entrance is about 20 miles wide.

The western shore of the bay affords no shelter from south-easterly winds, and has from 20 to 30 fathoms water within half a mile of it; the eastern side, north-westward of Kalambayang harbour, is not so steep, and affords good anchorage about 2 miles off, in 20 or 30 fathoms; but is also exposed to south-easterly winds.

Aspect.—There are several high mountains on the eastern shore, namely, the Keizerspiek or mount Tangkamus at its head, 7,480 feet in height, mount Pesawaren 7,480 feet, and mount Tangka 3,419 feet, the latter being situated within Kalambayang.

Tamping bay, about 3 miles to the northward of cape Rada, is an open bight, but has good holding ground in depths from 10 to 15 fathoms, one mile off shore, but exposed to south-easterly winds. Water may be obtained from the shallow rivulets that discharge into the bay, but with some difficulty, on account of the rocky shore.

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* *See* plan of Belimbing bay on chart, No. 2,761.

† *See* chart, No. 2,056.

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Tabúan island, lying nearly in the middle of the entrance of Semangka bay, is high and steep-to all around, beyond a short distance, except its north extreme, which is foul to the distance of about 3 cables; the only anchorage is on the north-east side in 25 to 30 fathoms, sand, very near the shore; it is a very indifferent one in the westerly monsoon. There is fresh water on the island, but the high surf usually renders landing difficult.

Tanjong Waringin village lies in the north-west part of Semangka bay, at the mouth of Semangka river, the water of which is good, but boats will find it difficult to enter. The land is low, and marshy near the sea.

The best anchorage is east from the mouth of the rivulet, one mile distant from the shore. Vessels lie here usually without danger from south-easterly winds, which seldom throw a very high swell so far up the bay. Near Botong point, the southern extremity of the bay near Tanjong Waringin, there is a rocky ledge which projects about one mile, with 10 fathoms near it.

Kalambayang harbour,* on the eastern side of Semangka bay, is about three-quarters of a mile in extent, safe, and affords good shelter from all winds, with sufficient depths for all vessels. There are depths of 13 fathoms, mud, in the centre of the harbour, and from 8 to 10 fathoms about 2 cables off shore. The entrance may be easily recognised by the high and rocky Iyu island, which lies about a mile to the southward, and can be seen, in clear weather, about 15 miles. Half a mile north-westward of Iyu island lies Kelapa island.

Supplies.—Water may be obtained from a stream in the north-eastern part of the bay, whence there is a road leading to the village, which is situated in a valley, about three-quarters of a mile from the landing place, and where probably supplies may be obtained.

Directions.—In the north-west monsoon, sailing vessels should enter the harbour by the western passage, between Kelapa island and Napal point; and when the latter bears about West, anchor near the eastern beach in 10 fathoms, mud, or anywhere in the harbour, there being no hidden dangers.

In the south-east monsoon, steer in between Iyu and Kelapa islands. With a commanding breeze a vessel may pass eastward of

* *See* plan of Kalambayang on chart, No. 2,056.

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lyu, between it and Vogel or Bird island, or between the latter island and the main, but this channel is narrow. Rover rocks, off South point, are easily avoided, as most of them are above water; pass westward of them.

Kiloang harbour* lies 5 miles south-eastward of Kalambayang, and affords safe anchorage. It may be known by Tonkali island, which is visible 12 miles in clear weather, and lies off the south-east point of the harbour, being separated from the main by a boat passage.

Kiloang island, small, and not very high, lies within Tonkali island, with some rocks at its northern and southern extremes, a reef to the eastward, and a smaller one on its western side. In the bight north-eastward of Kiloang island the depths are 4 and 5 fathoms in the entrance, and a high swell sometimes breaks there; eastward of this there is apparently anchorage in 11 or 12 fathoms, but caution is necessary in making use of this inner portion, which is but little known. The anchorage under Kiloang island should be taken.

Directions.—To enter Kiloang harbour, approach Tonkali till it bears East, distant 2 or 3 cables, when three groups of black rocks will be seen, the south-westernmost of which bears N.N.W. from Tonkali. Steer about E.N.E. between the island and rocks southward of Kiloang island, in from 30 to 20 fathoms, for the eastern side of the harbour, which is very high; when the centre of Kiloang island bears West, good anchorage may be taken in 13 fathoms, sheltered from all winds. Sailing vessels may run out with the land wind which blows here from the northward, but it is recommended to have a boat in attendance to tow, lest they should get becalmed under the high land. Although the bay outside Kiloang harbour is spacious, it is advisable to pass close to the westward of Tonkali.

COAST.†—From Kiloang harbour the coast takes an easterly direction for about 8 miles to Tikus point, the west extreme of Lampong bay. The Tuju islets lie about half a mile off shore at 2 miles eastward of Tongkali island, and there are other rocks near the coast farther eastward.

Batu Belantung, on which the sea generally breaks, lies about a quarter of a mile off shore and three-quarters of a mile south-west from the west point of Peper bay; it is connected with the islet north of it by a ridge.

* *See* plan of Kiloang harbour on chart, No. 2,056.

† *See* chart, No. 2,056.

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Peper bay, on the west side of Tikus point, is about three-quarters of a mile across, and has a large three-cornered rock in the middle. The water appears to be deep.

LAMPONG BAY, between Tikus point on the west and Kelapa point on the east, is about 23 miles wide, and extends nearly the same distance in a northerly direction. Several islands lie along the western shore of the bay, between which and the main there are several sheltered anchorages. In every part of the bay, from north to south, will be found from 10 fathoms, mud, to 20 fathoms, clay bottom.*

The eastern side of Lampong bay, between Telok Betung and Chondong islands, is high, free from danger, and has 14 to 15 fathoms, close-to. From Chondong islands to Kelapa point the coast, at 2 or 3 cables distance, is fronted by a line of rocks, on which the surf breaks heavily with westerly winds, and renders landing difficult.

Dangers.—If a vessel keep outside the islands on the western shore of the bay there are but two dangers, both of which may be easily avoided. The first is a sandbank, dry at low water, surrounded by a reef, with depths of 17 fathoms, mud, close-to and lying S.E. by E. 1½ miles from Kalagian island. The other is a reef of 1½ fathoms, lying S.E. by S. distant 1¼ miles from the easternmost Chondong island.

Pedada bay, the first bay to the northward of Tikus point, is 1½ miles wide at its entrance, and 3½ miles deep.

When steering into the centre of this bay in the direction of mount Tangka, the depths will be 20 to 15 fathoms, clay and mud, and the three small islands of Pedada, Penarian, and Lalanga will be seen.

Pedada is the easternmost and highest; N. by E. from it about half a mile there are two detached reefs, which usually break; a third reef lies N.E., about 1¼ miles, bearing W. by S. from the north point of the bay. Between the latter reef and the other two, there is a channel leading to an anchorage in 15 fathoms water, very near the

See chart, No. 2,056.

* Telok Betung, at the head of Lampong bay, was destroyed by the earthquake in 1883. It is probable that parts of the bay may have altered, and therefore the information relative to it must be used with caution.

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village of Pedada. This village is to the westward of Lalanga island, and stands on a clear fresh-water stream.

The high rocky islet of Kelapa is connected with Pedada point, the north extreme of the bay, by three groups of rocks above water, with a passage for small craft between each of them. North-eastward of Kelapa lie three patches of rock, with 16 fathoms, clay, between; to avoid them keep Setenga island to the westward of North. This small island is also high, with a reef extending about 2 cables from its north-east point.

Pundu bay, lying 4 or 5 miles to the northward of Pedada bay, is 3 miles in length by 2 miles in breadth, with depths of 7 to 10 fathoms. Across the entrance lies Puhawang, the largest island in Lampong bay, with a peak on its northern side; eastward of it is Little Puhawang, to which it is connected by a reef.

Pundu bay may be approached on either side of Puhawang. When taking the northern passage, which is preferable, the white coral reefs lying about 1½ miles north-east of Puhawang island are seen at some distance; avoid also the reef projecting 3 cables north-eastward from the island, with 15 fathoms close-to. There is also a detached coral reef close to the north-west point of Puhawang, which must be kept on the port hand, and another apparently off Badong point; the four coral reefs, lying in mid-channel north-west and west from the centre of Puhawang, should now be seen, and kept on the starboard hand.

The depth of 8 to 9 fathoms, mud, will be found a convenient anchorage, with Pundu village bearing West, and Punda point S.E.

Entering by the southern channel, south of Puhawang:—Keep Setenga island bearing southward of S.E., astern, until within half a mile of Puhawang island to avoid the coral reefs projecting from the south side of the bay; thence keep at that distance from the south shore of Puhawang in not less than 9 fathoms.

Ratai bay, just north of Pundu bay, is 3 miles in extent, with from 8 to 13 fathoms, mud bottom; on the south side of the entrance lies Kalagian island, which is high.

At about half a mile South from the east point of Kalagian lies a coral reef, showing at low water like a black spot.

Ratai bay may be approached on either side of Kalagian; and the two reefs, which dry at low water, to the westward of the island, may

See chart, No. 2,056.

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be discerned at some distance, and consequently avoided. They are not in mid-channel, and lie north-west and south-east of each other, with from 4 to 9 fathoms between them and Kalagian. Three streams lie on the western side of the bay, on which are the villages of Sabo, Ratai, and Penjindongan, fronted by a bank from half a mile to a mile off shore. Menango village lies on the north side of the bay.

Mahitam island lies off the north point of Ratai bay, with which it is connected by a reef. There is a good anchorage on its north side, in 13 fathoms, mud.

Tegal island, flat-topped and conspicuous, lies nearly 2 miles north-eastward from Mahitam. Between Tegal and the western shore some sandbanks obstruct the passage, leaving but a narrow channel, with depths of 14 fathoms, mud.

In the bay north-westward of Tegal is the village of Horun; and near the south point of the bay is the small island Lahu, connected to the shore by a reef, which also projects to the northward. The general depth in this bay is 9 to 11 fathoms, mud, and on its northern side is Tabikel islet, on the shore reef. Between it and Tankil island there is a channel with 9 fathoms, mud.

Tegal island, with its flat top, is visible throughout the whole of Lampong bay. When coming in from the eastward, a vessel may steer for it on a N.W. bearing, and pass it in 15 fathoms; entering from the southward it is also a useful mark from Lagundi strait.

Tankil island lies 3 miles northward of Tegal. Its north side is low, but the south is high; and from its eastern point a reef stretches off 2 or 3 cables, showing, at low water, some black spots, which may be passed in from 9 to 14 fathoms.

The head of Lampong bay, northward of Tankil, is about 4 miles wide, and contains four islands:—Pamagotang, an islet lying nearly 2 miles north from Tankil, is a sandbank with some trees, and is surrounded by a reef which extends to the distance of 3 cables southward and westward of it. A bank with 1¼ fathoms least water, and 1½ cables in extent, lies S.S.E. distant 4 cables from the islet. Kobur island lies about 8 cables south-west from Pamagotang, and about 4 cables off shore. Passarang is a low island, lying 9 cables northward of Pamagotang, and on the west side of Telok Betung road.

See chart, No. 2,056.

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Reefs.—Buoy.—In addition to these islands there are several coral reefs, with depths varying from one foot to 3 fathoms: the easternmost, with 3 feet least water, lies with Pamagotang islet bearing S.S.W., distant 7 to 8 cables; its north-east side is usually marked by a black beacon buoy with ball.

Foul ground extends about 3 cables southward of the coast under Apen hill, north-east side of Telok Betung road.

TELOK BETUNG* lies at the head of Lampong bay, and is the chief place of trade in this district. (*See* p. 8.) Its population consists of natives of Sumatra and Bugis, with a Regent from the Dutch Government as their Chief.

LIGHT.—A *fixed red* light is exhibited from an iron frame, painted white, which stands on the beach, about 440 yards north-eastward of the new pier, at an elevation of 48 feet above high water, and visible in clear weather from a distance of 6 miles.

Supplies.—Coal.—Telok Betung is a coaling station for vessels of the Netherlands Navy.

Mails.—Telegraph.—There is a mail steamer to Telok Betung from Batavia fortnightly; it is also connected with Batavia by telegraph. (*See* p. 9.)

Directions.—When bound to Telok Betung, after passing eastward of Tegal, be careful not to bring its east point to the eastward of South, in order to pass eastward of Pamagotang and the adjacent dangers. When the south point of Passarang bears southward of West, and not less than 8 cables distant on account of the reefs eastward of it, haul to the north-westward for the pier, off which at about three-quarters of a mile distant, good anchorage will be found in 7 to 9 fathoms, mud. There appears to be good shelter for small craft south-westward of Passarang island, in about 3 fathoms.

Panjang harbour and river, eastward of Telok Betung, is fronted by a sand spit extending three-quarters of a mile northward from the point southward of the river. There is apparently good shelter in the harbour, from 3 to 4 cables in extent, formed within this spit, in 6 to 7 fathoms, clay; the entrance, with a depth of 6 to

See **chart**, No. 2,056.

* *See* plan of Telok Betung, No. 940, and footnote on p. 361.

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9 fathoms, is about half a cable wide, from which the river mouth bears about S.E. ½ E. This information is gathered from plan, No. 940.

Chondong islands are three in number, of which the northernmost is a steep rock; the two others are larger, but not so high. Between them are narrow passages, with 12 fathoms water; and between them and the main the depths are from 10 to 14 fathoms, mud. From the easternmost island a coral reef projects 2 cables south-eastward; and at 1¼ miles S.E. ½ S. from the same island lies the coral reef of 1½ fathoms before mentioned.

Kraanvogel or Crane island, 9 miles south-eastward from Chondong islands, and connected to the shore by a coral reef, with 9 fathoms close-to, is difficult to discern, as it lies close to the high land, and consists only of a single rock; just to the eastward of it, however, there are some white limestone rocks on the shore.

Lubuk or Belantung bay.—Eastward of Crane island the Sumatra coast forms Lubuk or Belantung bay, with depths of 4 to 5 fathoms, mud, into which discharges a salt water stream. The points of the bay on each side are fringed with rocks on which there is usually a high surf. A rock, dry at low water, and on which the sea generally breaks, lies 1½ cables off Tanjong Belantung.

Kalianda road lies about 2½ miles south-eastward of Lubuk bay. The village is fronted by a white sandy beach, with rocks above water off it, between which there are channels affording easy access to the shore. The submarine telegraph cable from Java, p. 352, is landed here.

A rock of 1½ feet lies about 3 cables from the shore, with the flagstaff bearing E. by S. ½ S. A rock, with a depth of 3 feet, lies close eastward of it.

The anchorage is in from 7 to 10 fathoms, mud, with the village bearing East, distant one mile. Vessels are prohibited from anchoring near the cable, which lies in a W.N.W. direction from the beacon with triangle and of the cable house at Kalianda.

Tiga islets, three rocky islets, lying about 7 miles southward of Lubuk bay and 3 miles off shore, appear as one when coming from

See chart, No. 2,056.

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the south-eastward. The westernmost islet is the largest, and on its north-west side a reef projects 2 cables, indicated usually by breakers; between the two south-easternmost islets there are depths of 18 fathoms.

RAJA BASA ROAD.—The land forming the south-eastern part of Lampong bay is high, and rises to two conspicuous peaks 3 or 4 miles inland, named Raja Basa mountains; the height of the north-west peak is 4,235 feet, and that of the south-east peak 3,920 feet. Raja Basa road was formerly frequently visited by China traders, it being an excellent place to obtain good water with facility, and other supplies.

The anchorage in Raja Basa road is between Tiga islets and the rocky bank which fronts the shore, but a vessel should not come under 12 fathoms, for the bank in some places projects to the distance of half a mile, having 7 fathoms close-to. The best anchorage is about a half a mile off shore, with Kelapa point in line with Varkenshoek, and the north peak of Raja Basa E.N.E., in 12 to 16 fathoms, blue mud. On these bearings a vessel will be just abreast the watering places.

Villages.—There are three villages on the shore of Raja Basa road.

Chanti village lies abreast that part of Raja Basa road where the best anchorage is. The best watering place is just north of the village.

Raja Basa village is just to the northward of Kelapa point. Watering there is difficult, at least, much more so than at Chanti, and the landing dangerous with westerly winds, as the coast there is always covered with high breakers.

Katimbang village lies between the two mentioned.

Kelapa point, the south-east point of Raja Basa road, is low, and covered with cocoa-nut trees. Between Kelapa and Hog points the coast curves in north-eastward for about 2 miles, and at the bottom of this bight are the two small islands Menkodo and Sekapal, surrounded by reefs. On the mainland abreast is a village near a river, off which small craft find shelter behind a projecting point. The depths throughout the bight are from 15 to 23 fathoms, decreasing near the shore to 8 and 10 fathoms.

See chart, No. 2,056.

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Tims or Collier rock, about 6 feet high, 33 yards in extent, and steep-to, lies 1½ miles north-westward of Varkenshoek, and about one mile off shore.

OFF-LYING ISLANDS.—LAGUNDI ISLANDS,* lying in the south-west approach to Lampong bay, and between 2 and 10 miles eastward of Tikus point, consists of seven islands, viz., Lagundi, Rond, Saka, Sunchal, Mangoman, Sasarat, and Tims; good timber, deer, and wild hogs may be obtained. Along the southern coasts of the first four islands, and also along the neighbouring coast of Sumatra, depths of about 40 fathoms, hard bottom, are found close in; the sea there in the north-westerly monsoon runs high, but on their northern side boats can generally land.

The following description is by Lieutenant Prins, Netherlands Royal Navy, but the coast line of the group is said to have been altered by the volcanic eruption in 1883, and pending further information must be used with caution.

Lagundi, the largest island of the group, is nearly 5 miles in length, and close to the southward of its west point are two high, round shaped rocks covered with verdure, with a boat channel between them. On the south-east side of Lagundi there is another rock or islet of the same character.

On the north side of Lagundi is Lagundi harbour, small, but safe, with depths of 9 to 15 fathoms. In the middle of the entrance is the small island Pattappan, behind which a small vessel may find good shelter from wind and sea. Lieutenant Prins stated there was room for several vessels, and that fresh water was found on Lagundi, south-eastward of Pattappan.

Mangoman island, lying a little northward of Lagundi harbour has depths of 15 to 22 fathoms, clay, all round, except on its eastern side, where the depths are 10 to 15 fathoms. Between Mangoman and the west point of Lagundi bay, is a patch of 3¼ fathoms; a reef also extends southward of the island for about 1½ cables.

Lagundi strait, between Lagundi islands and the mainland to the westward, is 2 miles wide, and may be recommended to vessels working out of Lampong bay in the westerly monsoon. About mid-channel is Sasarat island, which is high, with 10 fathoms

* *See* chart, No. 2,056.

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close-to ; near its west side there are some rocks, some feet above high water. The passage on either side of Sasarat are equally good, and with adverse winds or currents good anchorage may be obtained to the eastward of that island, in 10 or 12 fathoms.

A coral reef, with 2 fathoms water, and 13 fathoms around it, lies northward of Mangoman island, with the highest point of Sasarat bearing S.W. by W., nearly 4 miles, and the middle of Mangoman S. ¾ E. The reef is about 75 yards in length, and cannot be distinguished by discoloured water. When the passage between Rond island and the east end of Lagundi is open, a vessel will be north-eastward of the reef. The highest point of Lagundi in line with the west point of Lagundi harbour, leads well to the south-westward.

Rond, Saka, and Sunchal islands.—Rond island, off the east end of Lagundi, is about 2½ miles in length, in a north-west and south-east direction, and nearly one mile in breadth. Saka lies about one-third of a mile off the south-west point of Rond island ; and Sunchal about the same distance off the south-east point.

The depths between Lagundi and Rond island are from 9 to 14 fathoms, hard ground, but a strong current runs there at times. Saka has 20 or 30 fathoms close-to ; but three-quarters of a mile S.E. by S. there is a rock which covers at high water, usually visible by its breakers. This passage cannot be recommended, nor that between Rond island and Sunchal, for although the water is everywhere deep, the ground is uneven and the current strong.

Tims island, lying 3 miles eastward of Sunchal, is small, low, consisting chiefly of red clay, and surrounded by a broad reef with heavy breakers ; the channels on either side of it into Lampong bay are clear.

KRAKATOA ISLAND, an active volcano, lying in the middle of Sunda strait, was, before the earthquake in 1883, about 5 miles in length, in a north-north-west and opposite direction, and 3 miles in breadth. That portion of the island northward of the highest peak was completely destroyed by the upheaval, and the scattered fragments now form numerous banks in Sebesi channel. The island is now about 3 miles in length, east and west, by 1½ miles in breadth ; and from the peak, which is 2,657 feet high, the north side

See chart, No. 2,056.

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of the island is a perpendicular cliff, forming part of the arc of the crater, which lies between it and Verlaten island. No bottom was found at 155 fathoms, about 1½ miles north-westward of the peak, and where the larger portion of Krakatoa formerly stood. Reefs extend about one mile westward and south-westward of the island.

The reported site of Hudek rock is retained on the chart, 7 miles south-westward of the peak of Krakatoa, but its existence is doubtful.

Verlaten island, lying north-west of Krakatoa, is nearly three times larger in area than formerly, and is 673 feet high. It is also an active volcano separated from Krakatoa by a channel 2 miles wide. The island is about 3 miles in length in a north-east and south-west direction, by one mile in breadth. Reefs extend about 2 miles northward from the island, and about one mile eastward and westward.

Lang island, 443 feet in height, about 2 miles in length, north and south, and about half a mile in breadth, is separated from the north-east side of Krakatoa by a channel nearly 1½ miles wide. This island does not appear to have altered very much, but the channel formerly between it and Krakatoa was only 2 cables wide. A reef stretches out from its west side about 3 cables, and a new islet has arisen about three-quarters of a mile westward of its south point, while Polish Hat has disappeared. A large new reef lies between Lang and Verlaten islands.

Sebesi or Tamarind island, lying 12 miles northward from Krakatoa peak, is nearly 3 miles in extent, and circular. It has a peak, resembling a sugar-loaf, which rises abruptly to a height of 2,818 feet from the southern extremity of the island, and slopes gently down to the northward. Off the east side, at the distance of about half a mile, there are three islets named Husband, Little Tamarind, and Gorts, all of which are surrounded by reefs; a reef extends about a third of a mile off its north-east side.

Sebesi island produces a certain quantity of pepper. The village is on the east side, opposite Little Tamarind island.

Anchorage.—There is good anchorage around this island except on its south side, in 15 to 25 fathoms water; and at one mile from

See chart, No. 2,056.

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the north-east side there is an excellent roadstead, even in south-west gales, with 13 fathoms water.

Rocks.—The channel between Sebesi and Steers reef is partly blocked by Boom rock, a few feet above water, and by Hindostan rock which has a depth of 9 feet on it.

SEBESI CHANNEL, between Verlaten and Sebesi, is 8 miles wide; formerly it was frequently used by vessels working out in the westerly monsoon, in preference to the Great channel, as the depths were regular and vessels could anchor when convenient.

This channel is now obstructed by reefs, and should on no account be used. The two reefs almost awash and connected by a ridge, in this channel, named Steers and Calmeyer, are composed of mud and pumice; their configuration is continually altering, and they are stated to be gradually subsiding.

Calmeyer reef lies 7 miles north-eastward, and Steers reef, 8 miles N. by E. from Krakatoa peak. Depths of less than 3 fathoms extend 2 miles southward from Calmeyer, and 3 miles south-westward and north-westward of Steers reef; and there is a patch nearly one mile northward of Lang island.

Sea rocks, situated 6½ miles W. by S. from Sebesi peak, consist of three pyramidal rocks, steep to, and inaccessible. The southernmost, about 30 feet high, is the largest, and named Gap rock, on account of a cleft in it. They are connected by a reef, upon which the sea continually breaks. Other dangers not charted may exist in this neighbourhood.

SEBUKU ISLAND, 1,398 feet high, lies one mile northward of Sebesi island, and consists mostly of craggy hills. Its extent is 3½ miles north and south, and about 3 miles east and west. The inhabitants cultivate pepper.

Reefs and ledges project from the numerous points of Sebuku, but they do not seem to extend far off, except from the west point, from which a reef stretches off 1¾ miles; this reef is steep-to, but not dangerous because the westernmost rock on it rises to a considerable height above the water; it has a slight resemblance to Sea rocks.

Close to the east side of Sebuku is Shelter or Beschutter islet, which is high on the east side, has a reef on its south side, and forms

See chart, No. 2,056.

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with Sebuku a small bay, with 15 fathoms water, affording anchorage for coasters. A coral rock, lying in mid-channel between the east point of Sebuku and the north point of Shelter islet, renders it dangerous to enter this little bay from the northward with westerly gales; but there is a good road for large vessels in 11 to 13 fathoms off the east side of Shelter islet.

VARKENSHOEK, or HOG POINT (Tanjong Tua), is the south-eastern extreme of Sumatra, and between it and Fourth point on the Java coast, distant 14 miles, is the narrowest part of Sunda strait. The point has a round hill within it, 390 feet in height, and is easily distinguished when approaching it from the eastward.

Tanjong Bawang, at one mile eastward of Varkenshoek is precipitous. The coast from thence to Steile point, near mount Andong, is fringed by reef to the distance of half a cable.

A reef, having a rock above water near its western extreme, extends about a third of a mile westward of Varkenshoek.

ZUTPHEN ISLANDS* are situated within 2½ miles of the Sumatra coast, north-eastward of Varkenshoek. Four of them are large, and the remainder small, extending north-east and south-west about 4 miles, the whole being covered with trees and fringed with reef to the distance of about half a cable. There are several shoals in the passage between them and the coast, amongst which there is said to be anchorage. This passage is generally used by coasting craft, and might be taken by steam vessels, or sailing vessels with a commanding breeze, there being sufficient depth of water, but it is not recommended. The islands are steep-to on their south side, having a depth of about 40 to 50 fathoms near them.

Kandang, the south-westernmost of Zutphen islands, is about one mile in length, half a mile in breadth, 407 feet in height, and covered with large trees. Off its north-west side are two coral islets, steep-to on their western sides. Near these islets on the north-west side of Kandang there is a small bay that affords a safe anchorage to coasters in 11 to 12 fathoms water, close inshore.

High and Penyurit islands, lying to the eastward of Kandang, and respectively 315 and 374 feet high, are rocky, covered with trees, and separated by narrow channels. Between Kandang and High island is a small islet with coconut trees.

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* *See* chart, No. 2,056.

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The north-east, east, and south-east sides of Penyurit island are foul to the distance of 2 cables.

Kelapa island, north-westward of Kandang, and close to the coast of Sumatra, is small, low, and surrounded by a reef, which is steep-to.

The Brothers, lying to the northward of High island, are two low, sandy islets, covered with brushwood, and surrounded by a narrow reef, with deep water close-to.

A small vessel may pass southward of the Brothers islands, as this channel has 18 to 20 fathoms water; but its narrowness and the currents, sometimes at the rate of 2 and 3 miles an hour, render it dangerous, and the more so as the depths increase speedily to 30 and 40 fathoms. Care should also be taken to avoid the reef off the north-east point of Penyurit.

Rimau island, the northernmost and largest of the Zutphen islands is also the highest, its summit being 804 feet above the sea. The north-west end of the island is low for 400 yards from the extremity, a portion of which is a sandy beach, affording a good landing place. The island is partly fringed by a reef to the distance of half a cable, with 5 fathoms close-to.

Boompjes reef, 3½ cables in length, situated on the south-west side of Rimau, is partly above high water, with a narrow channel between it and the island: there are two islets covered with brushwood on the reef.

Rimau Kechil islet.—Rimau Kechil, a rocky islet, 210 feet high, lies close to the north-east point of Rimau. Geni reef extends about half a mile from the north point of Rimau, having a sandbank above water, and a coral rock dry at low water, with depths of 11 and 12 fathoms close-to. From the northern point of this reef the north point of Rimau Kechil is in line with Toppers island; and from its western edge the west point of Rimau is in line with the west point of Kandang island.

Tompul island, westward of Rimau, is a small, low, wooded island, surrounded by a narrow reef, which is steep-to.

See chart, No. 2,056.

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Coral rocks.—Southward of Tompul and nearly in mid-channel, are two steep coral rocks, named Panalang and Usumbera, with small sand patches just showing above high water. They lie with Boompjes reef and the north-east point of Thwartway island in line. Close around and between these reefs are depths of 8 to 23 fathoms. Further south lies a coral rock, steep-to and dry at low water, with Boompjes reef in line with the north point of Toppers island, and the southernmost point of Sumatra in line with the east point of Kelapa island.

Anchorages.—There is anchorage between Hog point and the Zutphen islands. If in either of the monsoons a sailing vessel cannot work through, or is detained by calms or currents, she may anchor at about half a mile south-west of Sindo island, in from 5 to 30 fathoms, sand; thence the land wind will enable her on the following morning to pursue her voyage. Just to the westward of Sindo there is a stream of good water, near Begantungan village, with anchorage off it in 6 to 7 fathoms.

Steile point.—On the Sumatra coast, abreast the north point of Rimau, is situated Steile point, bluff and steep, the ridge of hills behind attaining at mount Andong the height of 810 feet; northward of Steile point the shore reef extends one cable off the village, while still farther north the coast is fronted with a mudbank, which makes landing difficult. There is anchorage in 7 to 10 fathoms, mud and sand, north-eastward of Steile point, with the village and a freshwater spring nearly abreast.

Directions.—The passage inside Zutphen islands, is not recommended, but the following directions, which however are very old, might prove useful to a vessel attempting it.

From the northward, and approaching Rimau island, to clear the reef off its north and north-west points, bring the west point of Kandang midway between Tompul and Rimau islands, and steer for it; thence passing close to Tompul, and between or to the eastward of the coral rocks which lie in mid-channel southward of that island. Having passed these rocks, steer in close to Kelapa island, by which a vessel may run freely past the visible reefs north-westward of Kandang, in depths of 16 to 20 fathoms, which will increase southward of Kelapa island to 30, and eastward of Varkenshoek to 50 and 60 fathoms, no bottom. *See* tides, p. 344.

See chart, No. 2,056.

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Working out of Sunda strait during the north-west monsoon.—The best route is between Zutphen islands and Stroom rocks, giving Zutphen islands a berth of 1½ miles, thence work up by short tacks along the coast of Sumatra to Varkenshoek. In working through the passage between Sebuku and Sumatra, pass either northward or southward of Tiga islets, as most convenient; thence to the northward of Tims island, and between it and Sunchal, or through Lagundi strait. In this manner a sailing vessel will make a quick passage through the strait, if the wind be not too variable, besides having the advantage of anchoring on the east side of Sebuku island, or in Lampong bay, if the current or wind be too strong.

This route is not known to have been effected by the earthquake of 1883, but great caution should be observed.

There are, however, on record, many instances of vessels having worked out of the strait along the coast of Java, during the westerly monsoon, with more ease and celerity than could have been effected by stretching into Lampong bay, in consequence of the westerly current having at those times developed its chief strength along the former side of the strait.

The COAST. — Sunda strait, northern approach. — Aspect.—The coast northward of Steile point and mount Andong again becomes flat, trending northward for a distance of 3 miles to Kangalan point, thence in the same direction about 150 miles to Banka strait. A hill within Kangalan point, 827 feet high, appears to be the northern termination of the hills extending from Raja Basa mountain; thence northward the country is densely wooded and flat as far as Nibung river.

Nibung hill, 774 feet high, the southern peak of a group of hills, situated about 22 miles northward of Kangalan point, is rather conspicuous from the southward. Mount Imbung, 840 feet high and covered with trees, lies about 5 miles northward of it; Knobbelberg 968 feet in height, 8 miles farther to the north-westward, has a knob on its crest, and when coming from the southward will be seen directly it opens of mount Imbung.

Kangalan point.—Reefs.—A coral reef 2½ cables in extent, with a least depth of 2½ fathoms, lies 2½ cables off Kangalan point, and about one mile southward of Logok island, with depths of 5 to 10 fathoms close-to. A coral patch of 6 fathoms lies 2½ cables

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See chart, No. 2,056.

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north-east of this reef, and a patch of 2½ fathoms at half a mile southward.

Logok is a small but high island covered with vegetation, lying one mile north of Kangalan point, one cable within the edge of the 3-fathoms line of soundings, and half a mile off shore.

The Gezusters (Sisters) are three small low islands lying about 3 miles northward of Logok island. The northernmost and largest is about 2 cables in extent, and covered with cocoanut trees; the other two are covered with trees and bushes, but not so readily distinguished from any distance. They all lie within the edge of the 3-fathoms line.

A reef with a depth of 2 fathoms was reported to lie one mile eastward of the Gezusters, with North island bearing N. ¼ E., and the middle of Gezusters islands W.N.W.; it was unsuccessfully searched for by H.N.M. surveying vessel, *Blommendal*, in 1885; but a patch of 5½ fathoms, coral, with 13 to 20 fathoms around, was found at one mile eastward of the northern Gezuster.

North island, lying 3 miles north of the Gezusters, is a low coral island covered with tall trees, 4 cables in extent, 1½ miles off shore, and encircled by a reef extending in some places to the distance of a cable. A conspicuous tree on the north end of the island may be seen from a distance of 14 miles.

Sina islet, lying 1¼ cables southward of North island, is covered with bushes, and there is a depth of 8 to 9 fathoms between the steep coral reefs fringing Sina and North islands.

Sibrandi reef, a coral patch of 3½ fathoms, with 6 to 8 fathoms close-to, lies with Sina island bearing West, distant about half a mile; a patch of 5½ fathoms lies 2 cables N.N.W. of it. Mount Andong open eastward of Logok islet leads eastward of these patches.

Between North island and the mainland there is a channel about 3 cables wide with from 8 to 16 fathoms water. Vessels taking it should pass about 1½ cables westward of the island; keeping the summit of Rimau island open just eastward of the northern Gezuster, will lead clear of the edge of the 5 fathom bank extending from the shore.

Anchorage.—Between North and Gezuster islands the coast is edged by a mud bank; at 2 miles from the shore will be found good

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See chart, No. 2,056.

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anchorage, in from 8 to 10 fathoms, mud, with North island bearing N. by E., and about the same distance. Small craft will find good anchorage between the Gezusters and the main, in 2 to 3 fathoms water.

In the easterly monsoon, there is a considerable sea at times; vessels may then anchor under the lee of North island, in 10 to 16 fathoms, mud and sand. The holding ground is generally good in these anchorages, but the bottom should be ascertained before anchoring, as many isolated patches of coral exist.

Sekampung river, 6 miles northward of North island, is about 2 cables wide in the entrance, and half that width at a short distance within; it takes its rise in the mountains situated at the head of Keizer bay, and traverses the whole southern portion of Sumatra. Its south point of entrance is sharply defined, but when abreast, the entrance is difficult to distinguish. There is but 2 to 3 feet water on the bar, deepening to 4 and 5 fathoms within, where boats may water during the ebb tide. The velocity of the stream in the river is from 1½ to 2 miles an hour.

There is good anchorage at about 1½ miles off the entrance, during the westerly monsoon period, in 6 fathoms, mud, with North island bearing S. ½ W.

Coast.—From Sekampung river the coast is low, covered with wood to the water's edge, and trends northward 19 miles to Penat point and river; thence a further distance of 20 miles in the same direction to Sekopong point. It is fronted by shallow banks, which off the latter portion extend from 10 to 15 miles from the shore.

The Maringei river debouches on the coast, directly eastward of mount Imbung (p. 374), and may be entered by boats at high water. The flourishing town of Maringei lies within the entrance. Northward of the Maringei a sandy beach commences, whilst to the southward tall trees fringe the shore.

A patch of 3 feet, with 3 fathoms close to, lies nearly 2 miles off shore, with mount Imbung bearing W. by S. ½ S., distant 5½ miles; and a patch with less than 3 fathoms lies 1½ miles off shore with the mount bearing W. ¾ N.

See chart, No. 2,056.

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Shahbundar bank.—Between Penat point and Tanjong Sekopong, situated 20 miles to the northward, the shore bank within a depth of 5 fathoms, extends 10 miles off abreast the Two Brothers islands, the channel between the bank and those islands being about 6 miles wide. Within this 5 fathom depth, and extending from 5 to 6 miles off shore are several ridges of sand and coral with depths of 1½ to 2 fathoms, named the Shahbundar bank. A patch of 4 fathoms lies 10 miles off shore, with South Brother bearing S.E. ½ E., distant 7½ miles.

TWO BROTHERS (Segama) are low islets lying 15 miles off shore in lat. 5° 10′ S., and together extend one mile in a north and south direction. The northern islet is small and round, and the southern is 4 cables in length. They are thickly covered with brushwood and tall trees, one of which, on the southern islet, may be seen in clear weather about 20 miles off. Each islet is encircled by a coral reef partly dry, which extends in places to a distance of 1½ cables.

A rock with 3 feet water lies 2½ cables S.W. by S. from the south islet.

There is a depth of 5 to 6 fathoms midway between the two islets.

Swallow bank, with a least depth of 22 feet,* is a round patch of coral, about half a cable in extent, with 8 to 10 fathoms, mud and sand, close around, and lies with the Two Brothers bearing N. by E. ½ E., distant 7¾ miles. Vessels of heavy draught should give it a wide berth, as except under very favourable circumstances (calm water and with a current of not less than one knot), there is no ripple to indicate its position. At one cable south of Swallow bank, is a patch of 5 fathoms, sand and shells, with 9 fathoms between it and the bank.

Lynn reef, composed of coral, one cable in extent, with a least depth of 2 feet, lies with the highest part of the southern of the Two Brothers bearing W. by N. ¼ N., distant 6¼ miles. There are depths of 6 fathoms close to the reef, deepening to 12 fathoms at one cable distant.

The extremes of Two Brothers islands subtend an angle of 9 degrees at the reef; if therefore they be made, whilst passing on (or within a point or more of) the above bearing to subtend an angle of 8°, a

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See chart, No. 2,056.

* H.N.M. surveying vessel *Blommendal*, 1885, gives the least depth as 27 feet.

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vessel will pass about a mile outside the reef; and if an angle of 10°, half a mile inside it. In calm weather the shoal from its dark colour is extremely difficult to see until close upon it; a sharp look out should always be kept as the shoal may only be detected by a slight ripple. At night it is recommended to close the Two Brothers islands and pass them at the distance of from one to 2 miles.

Brouwers reefs are two coral reefs, about 8½ cables in extent, with a dry patch of sand and coral upon each, and depths of 11 to 14 fathoms around. Between the two patches there are depths of 10 to 14 fathoms.

The northern reef lies with the southern Two Brothers island bearing S.W. by W. ¼ W., distant 11½ miles. They may usually be seen from the distance of 2 miles.

Clearing marks.—Mount Imbung kept well open southward of the south Brother leads southward of Brouwers reefs, and the same mount open northward of the north Brother leads northward of the reefs.

The highest mountain seen in clear weather to the southward, when in this neighbourhood, is mount Karang (5,833 feet high), south-eastward of Anjer, but the round hill named mount Gedeh, 1,968 feet high, over St. Nicolas point, being about 20 miles nearer, is more often visible and is a good mark,

At night, vessels should steer to pass within a prudent distance of North Watcher light.

At about 6 miles north-westward of Brouwers reef, with Two Brothers bearing S.S.W., distant 8 miles, a bank with 6½ fathoms (least water found) was passed over by H.M.S. *Magpie*, 1883.

NORTH WATCHER, the summit of which is situated in lat. 5° 12¼′ S., long. 106° 27½′ E., is 2 cables in length, 1⅓ cables in breadth and covered with trees, the tops of which are visible in clear weather from a distance of 18 or 20 miles. On the north-west side there is a cove with a rough pier, affording landing for boats.

The island is surrounded by a coral reef, which dries in places, and extends on the east and south sides a distance of 2½ cables.

Omega rock, about 1½ cables in extent, and with a depth of 3 feet, is steep-to, and lies 5½ cables E.S.E. from North Watcher lighthouse.

See chart, No. 2,056.

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Karang Pajong, a patch of 5 feet, lies 5½ cables S. by W. from North Watcher lighthouse. Between these reefs and the island the depths are 14 to 16 fathoms, mud and sand. These reefs will be avoided by keeping the angle of elevation of the light at 2° or less.

LIGHT.—Near the centre of North Watcher island, from an iron tower 15 feet in height, is exhibited at an elevation of 159 feet above high water, a *white* light which *revolves* once *every minute*, and should be seen in clear weather from a distance of 18 miles. The light shows for 8 seconds and is eclipsed 52 seconds; within a distance of 16 miles the eclipse is not total.

Anchorage.—At the distance of about 7 cables from the lighthouse, in all directions, there is good anchorage in 12 to 13 fathoms; nearer the island the water is deeper in places.

Arnemuiden bank is a sandbank above water, on a coral reef about a quarter of a mile in extent, awash in places at low water, with depths of 12 to 13 fathoms close-to. It lies with North Watcher lighthouse bearing West, distant 16¾ miles.

Etna bank, situated S.E. by E. ¾ E., distant 11 miles from Arnemuiden bank, is also about a quarter of a mile in extent, with a similar dry sandbank near its centre. There are general depths of 12 fathoms, mud, all round at about 3 cables distant, with deeper water nearer the bank.*

THE THOUSAND ISLANDS, about 80 in number, with their outlying dangers, occupy a space of about 23 miles in a north-north-west and opposite direction, with a breadth of 12 miles near their northern end, and 5 miles at the southern. They are situated in the northern approach to Sunda strait, between lat. 5° 24′ and 5° 47′ S., and long. 106° 23′ and 106° 37′ E.

The islands are mostly low, of coral formation, encircled by reefs varying in distance from one cable to one mile, and densely covered with trees, the tops of which are visible from 14 to 16 miles.

The north side of the group is clear of danger; off the north-west side, Jason rock is the westernmost known danger, situated about 8 miles from the nearest island.

See chart, No. 2,056.

* Molenwerf bank and Brouwers shoal, reported to lie about 3 miles northward and 5½ miles eastward of Etna bank, respectively, having been unsuccessfully searched for, are considered not to exist, and have been removed from the Admiralty charts.

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On the western side of the group are several isolated reefs, varying in distance from one to 2 miles off the islands, but they may generally be seen by the discolouration of the water.

Three of the islands near the centre of the group are inhabited, namely, Panjang, Pelemparan, and Kelapa, the two latter lying close together. Each have about 200 inhabitants. Other islands of the group are temporarily inhabited by fishermen.

It is not advisable to attempt any of the intricate passages between the islands without local knowledge.

The islets and shoals bordering the eastern side of the navigable track to Banka strait will now be described ; full detailed information of the whole of the group will be found in Eastern Archipelago, Part II.

Tides and Currents.—It is high water, full and change, near the Thousand islands, during the easterly monsoon, at 10 p.m.; low water 7 a.m. ; rise $2\frac{3}{4}$ feet ; and during the westerly monsoon period at 10 a.m. and 7 p.m., respectively ; rise $3\frac{1}{4}$ feet.

From observations made on the tides and currents here, the flood stream, during light winds and calms, has been found to set to the eastward, and the ebb to the westward. This tidal stream is absorbed by the prevailing monsoon current, the flood stream strengthening the current running to the eastward under the influence of the westerly monsoon, the ebb stream reducing and sometimes neutralizing it. During the easterly monsoon period the ebb stream strengthens the prevailing current which runs to the westward, and the flood the reverse. There may be said to be but one tide in the 24 hours, the second tide being almost inappreciable. The ordinary strength of the current is from a quarter to one knot per hour ; occasionally as much as $1\frac{1}{2}$ and even 2 knots has been observed ; this is probably during the height of the monsoons only.

Jason rock, a dangerous coral patch in the fairway to and from Sunda and Banka straits, is about 50 yards in diameter, with a least depth of $2\frac{1}{4}$ fathoms, and from 16 to 19 fathoms close-to, except off its south-east side. The water is discoloured immediately around it, but at a short distance its position is only descernible occasionally by tide ripples. It lies with pulo Pebelokan or West island, bearing S.E. by E. $\frac{1}{2}$ E., distant $8\frac{1}{4}$ miles.

See chart, No. 2,056.

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Arminia rock, composed of coral and stone, is circular in shape, and about 55 yards in diameter, with a least depth of 2½ fathoms, and 12 to 16 fathoms, over mud, close around; it lies with the south extreme of West Dua island E. ⅓ S., distant 6¼ miles. Under favourable conditions its position is indicated by ripples, but not by discolouration of the water.

The reef on which the British ship *Hereward* struck in December, 1893, has been found by the Netherlands surveying vessel *Cheribon* to be a coral reef about a cable in extent with a least depth of 1½ fathoms, and 15 to 16 fathoms around. It lies with North Watcher light bearing N. by E. and the north point of West Dua island E. by S., thus verifying the position given by the *Hereward.* Its position may possibly be recognised by tide rips but not by discolouration of the water.

Pulo Pebelokan or West island, the north-westernmost of the Thousand islands, is 3 cables in length, densely wooded, and steep-to at half a cable distant, except off its sandy north-east point, where the encircling reef extends off a distance of 1½ cables. The tops of the trees are visible from a distance of 13 miles in clear weather.

Coventry reef, of coral, is 2 cables in extent, and awash at low water; foul ground extends about 2 cables north-west of it; on other sides there are depths of 15 to 17 fathoms at the distance of half a cable. The reef is marked by discoloured water, breaks with a slight swell, and lies with West island bearing N.N.E., distant one mile.

East Dua island in line with West island, leads northward, and East Dua in line with Rangat islet, leads southward of Coventry reef.

Rangat islet is one cable in length and surrounded by a sandy beach, with a reef extending in places to the distance of one cable. A few tall trees are growing on it.

Rangat reefs, about 6 cables in extent, are three detached patches with a least depth of 3 feet, and with deep water between and around them. From their extremes, Rangat islet bears N.N.W. ¼ W. and W. by N. ¾ N., about one mile.

Edeling reefs, two patches of 4 and 4½ fathoms are situated north-eastward of Rangat islet, nearly midway between West island and

See chart, No. 2,056.

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East Dua island, and 4 cables apart in an east and west direction. Their positions are occasionally marked by tide rips; both are steep-to with 15 fathoms water at a short distance.

Beronang reef, about one cable in extent, with 1½ fathoms least water, and 14 to 18 fathoms around, lies three-quarters of a mile north-west of the western Edeling reef, with North Dua bearing N.E. by E. about 2 miles. It may generally be seen by discoloured water or ripplings.

Dua islands are the northernmost of the Thousand islands and thickly covered with trees. They are each about 3 cables in length, and encircled by reefs to the distance of one cable. Northward of these islands the depths are regular, from 15 to 18 fathoms, sand and mud.

Channel.—There is a channel about 3½ miles wide between the islands and reefs above described, and the main portion of the Thousand islands. Vessels from the southward may pass through in safety, by keeping East Dua island between the bearings of N.N.E. ½ E. and N. by W. ½ W. until Panchalirang Besar (the north-east island of the main group) bears southward of East; these bearings lead between and clear of Rangat and Inderaputeri reefs.

Baka, a patch of 7 fathoms, lies between those bearings, with Jagung island N.E. by E. ⅓ E., about 3½ miles.

Inderaputeri or Cora reef, with a least depth of 1½ fathoms, and nearly 3 cables in extent, is charted with the west extreme of Jagung island bearing S.E., distant one mile.

Jagung island, the north-west extreme of the main group, is nearly 4 cables in length, densely wooded, and encircled by a reef to the distance of one cable.

Panchalirang islands lie between 2 and 3 miles north-eastward of Jagung island. Panchalirang Besar, the north-east island of the main group, is 4½ cables in length, densely covered with trees, and encircled by reefs to the distance of about 1½ cables. Beteloran Kechil islet lies 2 cables north-west of it. Panchalirang reef, with 2 fathoms water, lies 3 cables N. by W. of Panchalirang Kechil; detached patches lie also the same distance southward and westward of that islet. Butun islet, of sand and coral, with a broad spreading

See chart, No. 2,056.

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tree, lies three-quarters of a mile westward of Panchalirang Kechil, with patches of 3 fathoms at 2 cables north and 1½ cables north-west of it.

Ringit island lies nearly 2 miles southward of Panchalirang Besar or North-east island, and is 3½ cables in length, with a reef extending 1½ cables south-eastward of it.

Mayang reef, the only known danger to the eastward of the Thousand islands, beyond the reefs encircling them, is about half a cable in extent, with a least depth of 4½ fathoms; it lies with Ringit island bearing W.S.W., distant 1½ miles. For islands southward, *see* Eastern Archipelago, Part II.

SUNDA STRAIT TO BANKA STRAIT.

COAST.—General remarks.*—The coast between Sekopong point (lat. 4° 56′ S.) and Kenam point, 16 miles to the northward, is low, marshy, and thickly wooded. The outer danger is Clifton bank, about 9 miles eastward of Sekopong point. Within a depth of 8 fathoms the bottom is irregular; a least depth of 10 fathoms should be preserved.

From Kenam point northward to Lucipara point at the entrance to Banka strait, a distance of about 87 miles, the coast is also low, marshy, and almost uninhabited. At only a few places is there a sandy beach; with the exception of these and before the mouths of the larger streams the coast is fronted by a soft mud bank which dries to the distance of one to 4 cables or more, rendering landing impracticable.

The Masuji and Lumpur rivers afford communication for small trading craft with Palembang.

In clear weather, or during the westerly monsoon period, the tops of the trees are visible from a distance of about 16 miles in the offing, from the deck. The two principal points of recognition are the high trees on Menjangan point, and those between Serdang and Bungin points southward of Tulang Bawang river; but as depths of less than 3 fathoms, steep-to, extend about 14 miles off shore in about the parallel of these, they should not be sighted from the deck, but a least depth of 10 fathoms maintained when navigating along this coast in other than light draughts.

* *See* chart, No. 2,149.

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Patches of 4 fathoms, fairly steep-to, lie about 23 miles off shore between those points. The holding ground is good everywhere, but is irregular within a depth of 8 fathoms.

Winds.—*See* p. 24.

Tides.—Current.—It is high water, full and change, on this coast (in about lat. 5° S.) during the easterly monsoon at 10 p.m., and low water, 7 a.m., and in the westerly monsoon period, at 10 a.m. and 7 p.m. respectively; springs rise 4 to 5 feet, and neaps 2 feet. At Menjangan point to the northward, the rise is 7 feet and 3 to 4 feet, respectively. At the change of the monsoons, a second daily tide becomes apparent; at times the rise and fall is nearly equal in amount to the other. At this period, it is stated that the greatest rise and fall occurs at the first and third quarters of the moon.

The stream sets northward for about 6 hours, and southward for 18 hours; during the easterly monsoon period, from about 2 hours before noon until 2 hours after, the northerly stream runs (combined with current) at the rate of about one mile; and during the westerly monsoon from 2 hours before midnight until 2 hours after in the same northerly direction at the rate of about 1½ miles; during the remainder of the 24 hours, excepting the times of slack water, the stream is southerly at about the same rate. At times, the streams run for 2 or 3 days continuously in the same direction.

Leaving Banka strait in the daytime during the easterly monsoon, allowance should be made for the north-westerly set which then usually prevails. During the westerly monsoon period there is at times a southerly set at the rate of 2 miles an hour; it depends much on the weather northward of Banka island.

COAST.—Aspect.—Sekopong point, in about lat. 4° 56′ S., is a prominent point, covered with trees; its extreme, a small peninsula, has some tall casuarina trees on it, with lower trees on the neck.

The coast between Sekopong point and Kenam point, situated 16 miles northward of it, is marshy, and thickly wooded; the tops of the trees are visible about 16 miles in clear weather, but there are no points for indentification. The Knobbelberg and mount Imbung, to the southward, will be seen during the westerly monsoon, the clear weather season.

See chart of Banka and Gaspar straits, No. 2,149.

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A depth of 3 fathoms will be found at about 5 miles from the coast, and 5 fathoms at 8 miles, but within a depth of 8 fathoms the bottom is irregular; vessels should keep in about 10 fathoms. Anchorage may be obtained anywhere.

At about 2 miles northward of Sekopong point, in a small bay, are two houses, under a few cocoanut trees, inhabited by fishermen. Landing is difficult at low water on account of the mud flats fronting the coast. During the westerly monsoon fresh water is obtainable at the Wakau stream, 4 miles northward of the houses.

Shoals.*—A shoal of $1\frac{1}{2}$ fathoms, hard sand, just without the 3-fathom line, lies with Sekopong point bearing N.W. by W., rather over 5 miles.

Clifton bank, situated with the Northern Brother islet bearing S. 15° E., distant 14 miles, has a least depth of $2\frac{3}{4}$ fathoms, hard sand; it is steep-to on its south side, but eastward and northward the depths decrease gradually towards it.

A **shoal** of 3 fathoms, hard sand, lies 12 miles northward of Clifton bank, with Kenam point bearing N.W. by W. $\frac{1}{8}$ W., distant $7\frac{1}{2}$ miles. About midway between is a patch with less than 5 fathoms.

Seputih river entrance is in lat. 4° 41′ S., and 800 yards wide, with densely wooded banks; 8 miles up it is about 40 yards wide, with depths of 3 to 4 fathoms, but the bar fronting the entrance has but 3 feet over it at low water, rendering it navigable only for small coasting craft. The principal village, Surabaya Ilir, is on the right bank of the main stream, 6 miles above its junction with the Trusan, and about 12 miles above the entrance.

There is anchorage about 4 miles off the river, in $3\frac{1}{2}$ fathoms, with the river mouth N.W. by W. $\frac{1}{4}$ W., and Kenam point N.N.W. $\frac{3}{4}$ W.

Kenam point, about 5 miles northward of Seputih river, is thickly wooded and prominent when seen from the southward.

Bungin and Serdang points.—The coast trends northward from Kenam point to Bungin point, the shallow bight between

See chart, No. 2,149.

* Unsuccessful search having been made by H. Netherlands M. surveying vessel *Blommendal* for Comara and Ocean Mail shoals, mentioned in last edition, they have been expunged from the charts.

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being Telok Baru or Baharu ; thence northward to Serdang point in which portion are the highest trees in this neighbourhood, as before stated.

Tulang bank.—The shore between Kenam and Serdang points, and as far as Tulang Bawang river, is fronted by a bank of mud and sand with depths of 1½ to 3 fathoms to a distance of about 7 miles. Seaward of these is Tulang bank, consisting of many isolated patches of hard sand and broken shells, with depths ranging from one to three fathoms, and deep water between over a mud bottom, extending to the distance of nearly 14 miles off shore.

The two most outlying have depths of 2 and 2¾ fathoms, and lie respectively, with Kenam point bearing S.W., distant 15½ miles, and S.W. by W. ¾ W., about 12½ miles. The two-fathoms patch is steep-to on its seaward side. The shallow heads break occasionally during the easterly monsoon period only. The 10 fathoms edge of the bank is about 23 miles eastward of Kenam point, and there are depths of 7 to 8 fathoms near its edge, over a soft bottom. A depth of about 10 fathoms should be preserved when passing this bank.

Tulang Bawang river (lat. 4° 24′ S.) is about the largest on this coast. It is half a mile wide in its entrance, with a low water depth of 3½ feet on its bar (springs rise 5½ feet) and is thus available at times for vessels of about 8 feet draught. Within the bar, the water rapidly deepens to 5 and 6 fathoms, and is still 2 fathoms deep and about 90 yards wide at 60 miles above its mouth.

Beacons.—Directions.—The bar channel and flats are marked by two large and ten small beacons. From the anchorage in 3½ fathoms, mud, N.E. by N. 3 miles from the northernmost of the two large beacons, course should be steered to pass between the two large beacons, passing nearest to the southern one, thence close southward of the small beacons, which mark the flat extending from the north shore. The least water is within the eighth small beacon ; on the south side of the passage some rocks dry at low water.

To reach the anchorage from seaward, from the southward, Tulang bank should be rounded by the lead, and Masuji river entrance steered for bearing about W.N.W. until the depths are reduced to 4 or 5 fathoms ; when steer south-westward for the entrance to Tulang Bawang, anchoring as convenient with Babuayan point S.W. by S.,

See chart, No. 2,149.

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if not about to enter the river. It is only available with local knowledge, and the beacons are not to be depended on.

Water.—The river water is fit for drinking at low water at the end of the westerly monsoon period, but at other times is brackish.

Settlements.—The fishing village of Dinteh lies on the south shore. At about 1½ hours steaming up the river is the village of Telades, also on the south bank. Mengala, the residence of the Dutch Controller is 60 miles up, with a depth in the river as above given.

Masuji river lies 15 miles northward of the Tulang Bawang. It is about one mile wide in its entrance between Pasir and Masuji points with a low water depth of 5 feet; springs rise 6 feet. It is deeper and of more importance than the Tulang Bawang, as it enables small trading craft to proceed by its tributaries and the Ogan river to the Residency of Palembang, a voyage of about 14 days. The main direction of the stream is north-westerly for about 50 miles, whence it turns south-west.

Anchorage. — Directions. —There is anchorage in about 3 fathoms, 5 miles south-eastward of the entrance, and it should be approached from seaward with the entrance bearing about W.N.W.

To enter the river, from the anchorage steer towards the shore until Pasir point, which has some tall dark trees on it, bears N. by W., when it may be steered for, keeping towards Masuji point as it is approached to avoid the spit of mud and sand extending southward of Pasir point. About 2 miles up is the Sungi Bachak which has a depth of 6 feet; here, the Masuji is about 3 cables in breadth. Ten miles up the Masuji is the village of Lambung.

Menjangan point (lat. 3° 50′ S.) is a considerable rounded projection of the coast, with Telok Brugu or Gerugu within and northward of it.

The trees on the point and within it are rather low, but along the north-western portion there is a narrow stretch of tall trees, beyond which the trees gradually decrease in height again to brushwood on the marshy land towards Sudan creek. The tall trees from the offing appears as an island; hence its name on former charts as Tree island.

See chart, No. 2,149.

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These trees should not be in sight from the deck when passing Menjangan point, as the depths are only from 2½ to 3 fathoms at 9 to 10 miles east-south-east of it; a depth of 10 fathoms will avoid all dangers, and the lead should be kept going.

OFF-LYING BANKS.—Four Fathoms banks.—Eastward of the entrance to the Masuji a number of patches of mud and sand, with about 4 fathoms least water, will be found to a distance of 23 miles; the eastern group is about 4 miles in extent, north-west and south-east, at that distance, with depths of 6 to 8 fathoms between and around them. Vessels of other than light draught should pass eastward of them.

Arend bank is the south-east extreme of the five fathoms contour fronting Telok Brugu, northward of Menjangan point. It has a depth of 3¼ fathoms, and from 5 to 6 fathoms eastward and southward of it, with Menjangan point bearing W. by S. ½ S. about 15 miles. The tops of the trees are visible in clear weather from it, if at a height of 11 feet or more above the sea.

North-westward of Arend bank, within the 5 fathoms line, are patches of 2¾ to 5 fathoms with deep water between, and the bottom, though chiefly mud and sand, is hard in places. The northernmost of these patches, with 2¾ fathoms water, lies with Pasir creek W. ½ S. distant 15 miles. Between it and the creek, and also in the direction of Lucipara point, the bank fronting the shore with less than 3 fathoms occupies most of the space.

Five Fathoms banks.—From 12 to 20 miles eastward of Arend bank, and extending over a distance of about 7 miles north and south, are the Five Fathoms banks. They consist of nine ridges or banks with depths of 4¼ to 5 fathoms with a surface layer of sand, and depths of 6 to 8 fathoms, mud and sand, between them; the depths gradually increase to 10 fathoms eastward of them, over a mud bottom.

The westernmost, known as the City of Carlisle bank, is the shoalest found, it having a depth of 4¼ fathoms. The Boreas to the northward and an un-named bank to the southward of it have depths of 4¾ fathoms; the others have apparently not less than 5 fathoms. The easternmost 5 fathoms patch lies with Menjangan point bearing W. ¾ S. distant 34 miles. Vessels proceeding to or from Banka strait should not come under a depth of 10 fathoms when in their neighbourhood.

See chart, No. 2.149.

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Depths of 7 and 8 fathoms are charted about 14 miles north-eastward of the Five Fathoms bank. These depths were reported by H.M.S. *Imperieuse* in 1894, as having been obtained by Thomson's sounding machine. As this locality has not been sounded, shallower water may exist in this neighbourhood rendering it necessary for vessels to proceed with caution.

COAST.—Telok Brugu or Gerugu is the shallow indentation northward of Menjangan point; depths of less than 5 fathoms extend from 4 to 6 miles off. The shore is alternately sand and marsh; abreast the sandy portion landing may be affected but the marshy portions are fronted by mud. The head of the bay is named Telok Sundan, and into which the creek of the same name discharges.

Between this bay and Lucipara point the coast is all low and marshy, as before stated; several streams discharge here, the principal of which is the Lumpur. The mouths may be identified by the higher trees near them. The bank fronting the coast with depths of less than 3 fathoms, extends from 9 to 13 miles off shore, there being as little as 2 fathoms at 8 miles off shore. Its greatest distance is off the Lumpur river.

Lumpur river (lat. 3° 25′ S.) is of importance through being connected by its tributaries with Palembang, the Residency. The entrance is marked by nipa palms growing on the mud bank on either side, and has a depth at low water of 6 feet, increasing to 5 fathoms within; springs rise 7 feet. The river has a breadth of 1½ cables decreasing gradually to about half a cable; its main direction is N.W. by W. with gentle curves in the lower portion, but after 1½ hours steaming the river becomes tortuous.

The small vessels proceeding from the Lumpur entrance to Palembang take about five days; the Lumpur is followed as far as Chambi village, thence by Bungin creek to Deling lake, and then by the Komerin up to Sira Pulu Padang, thence by the Plaju and Musi rivers to Palembang.

Riding river, 5 miles northward of the Lumpur, is half a cable wide, with a low-water depth of 5 feet on its bar, with the high trees on the north shore bearing N.W. by W. ¼ W.; the depths within increase to 2 and 2½ fathoms.

Lobong Itam creek is about 90 yards wide with a least depth of

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See chart, No. 2,149.

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4 feet on its bar, which increases rapidly within to 2 fathoms; the best water over the bar is with the river mouth N.W. by W.

Coast.—From Lobong Itam creek the coast trends north-eastward to Lucipara point, a distance of 10 miles, and abreast the former is fronted by a bank of mud and sand, with less than 3 fathoms, to a distance of 13 miles, with one fathom only at about 6 miles off; abreast Lucipara point the bank extends off about 2 miles. It may be approached to a depth of about 5 fathoms.

Although this coast is uninhabited, trading craft are frequently met with coming from Palembang by the Lumpur, and from Banka strait; the men navigating them set up temporary shelters on shore, generally at the mouths of the streams, and employ themselves with fishing or with the cutting of nipa palms. A mudbank, dry at low water, fronts the coast, with but little interruption, from one to 4 cables.

DIRECTIONS.—Sunda strait to Banka strait (*continued from p.* 356).—A steam vessel will make for the fairway between the Two Brothers and the North Watcher lighthouse, giving a good berth to Swallow bank, Jason rock, and Lynn and Brouwers reefs; thence shaping course to pass eastward of the Five Fathoms banks in depths of 10 to 12 fathoms, and from thence direct to Banka strait. Some doubtful depths of 7 to 8 fathoms are charted north-eastward of the Five Fathoms banks. (*See* p. 389).

There is a passage 2 miles wide between Five Fathoms banks and Arend bank (3¼ fathoms) with depths of 12 fathoms, which is somewhat better sounded than that to the eastward. When approaching or leaving Banka strait during the easterly monsoon period, in the morning, there is usually a set north-westward, which should be guarded against, but the currents and tidal streams are very irregular.

Sailing vessels, having passed through Sunda strait, and bound to Banka strait, usually steer a direct course for Two Brothers islands. With a working wind, it will be prudent to keep within a moderate distance of the Sumatra coast. A good mark in daylight is, when standing inshore, to tack when North island is just on with Rimau, the highest Zutphen island; the depths will then be generally 7 or 8 fathoms, and a large vessel should not risk a less depth when

See chart, No. 2,149

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working between North island and Swallow bank, which she will pass eastward of, if the southern Two Brothers island be not brought eastward of N. by E.

Two Brothers islands may be passed at a prudent distance on either side. On passing to the eastward, take care to avoid Lynn and Brouwers reefs; and when passing between the islands and Shahbundar banks, a vessel should not keep farther from the islands than 3 miles, and not nearer the coast of Sumatra than the depth of 7 fathoms.

Having passed Two Brothers islands steer northward towards Banka strait, keeping Two Brothers islands to the westward of South, to avoid Clifton bank; and keeping in depths of about 10 fathoms, as a direct course cannot be depended upon on account of irregular currents or tides. Neither can the depths in this track be implicitly trusted to as a guide, being irregular, from 8 to 11 or 12 fathoms in some places; this is particularly the case near and eastward of the Four Fathoms banks northward of Tulang bank, eastward of the banks extending from Menjangan point (Tree island), and also in the vicinity of Arend and Five Fathoms banks. It will be, however, prudent to borrow towards the main if the depths increase to 12 or 13 fathoms; and to haul off from it if they decrease to 8½ or 9 fathoms.

Northward of Arend bank the coast may be approached with greater safety, observing that the bank fronting the coast southward of Lucipara point, with less than 3 fathoms, extends about 14 miles off. It may, however, be approached by the lead to 5 fathoms.

The trees between Bungin and Serdang points and the groups on the north-west side of Menjangen point, are the highest landmarks on this coast, but they should not be in sight from the deck, as abreast both points, shoals extend about 14 miles off. These trees afford some guide from aloft during the westerly monsoon period, which is the clear season, but would not be visible during the easterly monsoon, except on rare occasions.

If, at night, or in thick weather, a vessel should come into shallow water between Two Brothers islands and Lucipara island, and not being certain whether she is on either Arend or Five Fathoms banks, or that off the coast of Sumatra, it is advisable to anchor, and to wait for daylight, for the depths are moderate, and the bottom good, being mud, or mud and sand.

See chart, No. 2,149.

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At night, it seems advisable to steer to pass midway between Swallow bank and Jason rock, and for North Watcher light when bearing about N.E. by E. Jason rock lies about 2 miles within the range of visibility of the light in clear weather. From abreast the light, course can be shaped for Banka strait, &c.

Banka strait to Sunda strait.—The preceding directions reversed will apply to the return route. When approaching Two Brothers islands, they appear like one island, and hence some vessels are said to have been led into danger by mistaking mount Imbong and Knobbelberg, in Sumatra, when seen in the twilight, for them, but they must have been considerably out of their reckoning. Sailing past these islands at night, the position of the vessel should be well ascertained before dark, or else it would be better to anchor.

Having passed on either side of Two Brothers islands, they should be brought to bear northward of N. ½ E. when nearing Swallow bank; thence a course may be steered for Sunda strait.

See chart, No. 2,149.

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CHAPTER VII.

BANKA STRAIT—AND NORTH-WEST AND NORTH COASTS OF BANKA ISLAND.

VARIATION IN 1896.

Banka strait ... ... 2° E.

General Description.—Aspect.—Banka strait separates the islands of Banka and Sumatra, and from its southern entrance trends with many bends to the north-westward. It is available for all classes of vessels.*

The south entrance to Banka strait is encumbered with numerous banks of sand, having deep channels between; only two of which, however, viz., the Stanton and the Lucipara, are available for the ordinary purposes of navigation; both are buoyed; the Stanton is also lighted and is available for light or moderate draughts at night. The Lucipara is only available by day, for vessels of moderate draught.

The coast of Sumatra, forming the west side of Banka strait, is very low, densely covered with wood, and offers no other variation than a few points, which are only clearly distinct at short distances, and are easily mistaken for the so-called False points, which are observed immediately after rounding the real points. The whole coast is bordered by a mud flat, which is narrower off the points, but in some of the bights is from 2 to 4 miles wide. Towards the Banka side the bottom becomes gradually harder, and even rocky.

Banka island, forming the east side of Banka strait, has numerous hills and mountains, varying from 900 to 2,600 feet in height; and it is remarkable that, notwithstanding their comparatively small height, their summits are generally covered with clouds. On the

* *See* charts of Gaspar and Banka straits, No. 2,149; Banka strait with views, No. 2,597. Banka strait, south entrance, showing Lucipara and Stanton channels, No. 2,808.

Remarks on the whole of Banka strait, by Mr. W. Stanton, master in command of H.M. surveying vessel *Saracen*. 1859–60. amended.

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Banka coast are prominent points, sandy beaches, and in some places deep bights, as on the Sumatra side; as a rule, wherever sand occurs, casuarina trees will be found; the other trees are principally pune, teak, and aspen. Near the western point of Banka stands Muntok, the capital of the colony (or residency) of Banka. (*See* population, p. 415.)

Besides the few small islets and rocks in Banka strait, there is the group of Nangka islands, where sailing vessels sometimes proceed to procure fresh water and fire wood. Many rivers discharge themselves into the strait, of which the principal are the Sungsang and the Asing, in Sumatra, both navigable to a considerable distance.

Winds.—The winds in Banka strait follow the direction of the coasts, though with slight variations from the influence of the land and sea breezes; and fresh breezes may always be expected when working against the monsoon. During the latter part of the south-easterly monsoon it frequently blows hard from the south-west. Land breezes occur at night. (*See* winds, p. 25.)

Tides and Currents.—It is high water, full and change, in the south-east monsoon about 8h. 30m. p.m., at the south end of the strait, and 6h. 30m. at the north end; in the north-west monsoon high water takes place about 1½ hours later, but in the morning. (*See* also remarks, on p. 384.)

The tidal streams in Banka strait are strong but irregular, and are greatly influenced by the monsoons. The flood stream enters the strait at both ends, meeting near the Nangka islands. The direction of the streams is influenced by the windings of the strait, forming, at their meeting, whirls and eddies in the bights.

In Lucipara channel and the southern parts of the strait, sometimes there are two, but generally only one ebb and flood in the 24 hours, the former running to the southward and the latter to the northward. During the months of January, February, and March, at the greatest strength of the north-west monsoon, the southern stream continues often from 14 to 18 hours, with a rate of 2 to 3½ knots; the flood stream is then weak, and sometimes not perceptible. On the contrary, during the south-east monsoon, the stream of flood runs sometimes 14 to 18 hours with considerable velocity into the strait, and the ebb runs out during the other 10 or 6 hours with but little strength.

In the northern parts of the strait during the north-west monsoon, the southern stream or flood runs longer and is stronger than the ebb, and the reverse during the eastern monsoon. The velocity of the

See charts, Nos. 2,597 and 2,149.

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stream is sometimes 2 or 2½ knots, and the range from 7 to 12 feet, and sometimes more. In the mouths of the rivers the water during the north-westerly monsoon, from the heavy rains which prevail at that period, is much higher than during the south-easterly monsoon.

Between the monsoons, flood and ebb succeed each other generally every 12 hours, and the one or the other is then stronger, according to the wind being northward or southward.

On the Sumatra coast, when the monsoon is blowing strong, a constant surface current will be found setting to leeward, and extending nearly to mid-channel, except between Fourth and Batakarang points, where it is influenced by the considerable discharges from the large rivers lying between them.

On the Banka coast, owing to the formation of the land, more regular tidal streams will be found; therefore vessels in working should only keep on the Sumatra side between Batakarang and Fourth points, and then work along the Banka side.

Eddies.—When working through the middle of the strait during the strength of either monsoon, a continuous and contrary current is certain, and the skilful seaman will therefore find great advantage in availing himself of the eddies, as well as of the more regular changes of stream, by standing into the bights in those parts of the strait where he can safely approach the land.

In Toboali channel, also in the bay north of Nangka islands, and in the passage between Karang Brom Brom and Banka, even in the north-west monsoon, there is a regular succession in the roadstead tides. It has been often observed, when passing Muntok road, that the vessels were lying with their heads in a contrary direction to those at anchor upon the bank outside. In that road the flood comes from the westward, and the ebb from the eastward; but near the mouth of Sungi Banju Asing the contrary occurs; the flood there runs west and the ebb east. In the bays between First and Second points, and again between Third and Fourth points, there are probably eddies of which vessels of light draught may make use, and heavier vessels may no doubt, in many places, run close enough to the shore to keep out of the influence of the tidal streams.

Freshets.—Between Batakarang and Fourth points, after heavy rains, the ordinary stream is considerably accelerated and diverted by

See charts, Nos. 2,597 and 2,149.

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the freshets from the many rivers in this vicinity, in the direction of Kalian point, until it reaches mid-channel, to be carefully guarded against in the night.

Caution.—The buoys and beacons in Banka strait are not to be entirely depended on.

WESTERN SHORE OF BANKA STRAIT.

LUCIPARA ISLAND, 164 feet high, at the southern entrance of Banka strait, 9 miles eastward of Lucipara point, is half a mile in length, a quarter of a mile in breadth, and covered with trees, the tops of which are visible in clear weather at the distance of 14 or 15 miles. It is surrounded by a reef, which from its south-east end extends rather more than 1½ miles; and around this reef is a bank, with 2½ to 3 fathoms, extending about 1¼ miles to the north-westward from the island, and 2½ miles south-eastward of it.

COAST.—Lucipara point, which forms the south-western limit of Banka strait, is covered with trees, the tops being about 90 feet above the sea.

The coast between Lucipara and First points is formed of mangrove jungle, and was found in the survey of 1859 to have extended considerably.

The Dutch naval surveying officers state that the whole coast of Sumatra facing Banka strait, wherever mangrove is found growing, is progressing outwards. This remark applies to the bays, and more especially to the outlet of rivers, but not to First, Second, and the other principal points, where a different kind of tree will be found, and the rapid current sweeping round these abrupt points prevents any further extension taking place.

Green point, so called from the trees on it being of a lighter and brighter green than elsewhere, lies 9 miles northward of Lucipara point, the coast between forming a bight. Between these points is a ridge of high trees standing about 1½ miles back from the coast line.

First point lies 4 miles northward of Green point, the coast between forming a bight. The trees on it are about 60 feet high, and present a level appearance.

See chart, No. 2,597.

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Between First point and Second point is False First point, with a deep bight westward of it.

Mudbank.—Southward of Lucipara point, the 3-fathoms edge of the mudbank which fronts the whole coast of Sumatra is about 15 miles off-shore : off the point it is reduced to about 2 miles, which is reduced off Green point to a little over one mile ; abreast of First point, it is distant three-quarters of a mile, thence decreasing on its north-east side to the distance of a quarter of a mile.

From about 10 miles southward of Lucipara point, to within 2 miles of Green point, the depths decrease regularly towards the mudbank ; but just southward of, and fronting Green point, the water shoals suddenly from 6 to 3 fathoms, and therefore this part of the flat should never be approached into less water than 7 fathoms. Near First point the bank is also steep-to, and should not be approached under 12 fathoms.

The mudbank projects two-thirds of a mile from False First point and more than 3 miles from the shore in the depth of First bight between False First point and Second point. It is steep-to, and should not be approached under a depth of 12 fathoms near the points, nor under 10 fathoms in the bight.

Second point (Tanjong Tapa).—On this point the trees are about 80 feet high ; between it and Third point, distant 20 miles, the coast forms Second bight, which is about 5 miles deep.

The mudbank between Second and Third points fills the bight, and should be given a wide berth, as it shoals suddenly ; Second point bearing S.S.E. leads clear of all but the southern part of it.

Third point (Tanjong Kesugian), 20 miles north-westward from Second point, is 78 feet high. About 2 miles westward is the entrance of Sungi Kesugian, which is said to connect with one of the rivers leading to Palembang ; thence the coast trends westward to Fourth point.

The mudbank does not extend more than half a mile off Third point, but it is steep-to, and should not be approached under three-quarters of a mile, or in less than 13 fathoms water.

Between Third and Fourth points the bank is straight, its edge being from one to 2 miles from the shore. The depths between these points are irregular, but vessels may, with attention to the lead,

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See chart, No. 2,597.

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stand towards the bank into 7 fathoms, until nearly abreast of Fourth point, where the bank is steeper.

Fourth point (Katima Bongko), 23 miles westward from Third point, has trees upon it about 112 feet high.

The coast from Fourth point stretches westward for about 22 miles, and in this space the different rivers leading to Palembang fall into the strait.

The mudbank from Fourth point trends in a west-north-west direction for 18 miles, thence southward, forming one side of the entrance to Sungi Sungsang; a spit projecting from the land forms the other side of the entrance to that river, as also the south-east side of the entrance to Sungi Banju Asing.

Caution.—This bank for 6 miles westward of Fourth point is composed of hard sand, covered with a thin stratum of soft mud, is steep-to, and many vessels have grounded upon it. The lead cannot at all be relied upon for giving warning in time to avoid it, for 11 fathoms may be had and the vessel be aground the next instant. The safest plan is not to pass Fourth point within 3 miles, and to preserve that distance from the edge of the bank.

The depths, however, become more regular off the mouths of the Palembang rivers, and towards and abreast Batakarang point.

Great care, however, is requisite in navigating this part of the strait during the rainy season, for large drifts (floating islands, composed of trees and other vegetable matter) are then brought down these rivers by the freshets, which set strong over to the west end of Banka; and as the flood runs strong into them on the springs, a vessel may be driven too near either shore, both sides of which are fronted by dangers.

Off-lying banks.—A mudbank about 2 miles in length, and three-quarters of a mile in breadth, with depths of $4\frac{3}{4}$ fathoms, lies about 8 miles eastward of Fourth point, and nearly 3 miles from the shore.

A bank of sand and shells, having $4\frac{3}{4}$ fathoms water, lies 4 miles north-east of Fourth point, with depths of 7 to 9 fathoms between.

A patch of 6 fathoms lies $6\frac{1}{4}$ miles north-east of Fourth point.

SUNGI SUNGSANG or PALEMBANG RIVER.—At about 18 miles westward of Fourth point is the main entrance of Sungi Sungsang, navigable for vessels that can cross the bar as far as Palembang. The two eastern mouths, Saleh and Upang, are not navigable. The main entrance is upwards of a mile wide, with a

See chart, No. 2.597.

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depth of 9 feet at low water, and 21 feet at high-water springs; within it is contracted in some places to the width of a cable by the different islands and banks, until close to the town of Palembang, when the river widens to three-quarters of a mile with 5 and 6 fathoms close to the shore.

Buoys.—Directions.—A beacon buoy with ball is laid outside the bar of the Sungsang in about 3 fathoms, to mark the entrance, at about 5½ miles N. by E. ½ E. from Alangan point.

The channel into the river is marked on the starboard hand by stake beacons with ball, and on the port hand by stake beacons with cross and by black buoys, but on account of the many floating trees and strong freshets they must not be depended upon. It is said a vessel may enter at high water by bringing the trees, forming the west point of the river entrance, to bear S. by W. ¾ W., and steering for them on that bearing until pulo Payung (Umbrella island) bears South; then steer for the island, but take care in approaching it to keep close to the eastern bank of the river, to avoid the spit extending off its north end. It would be advisable, however, to send for a pilot to Kampong Sungsang, the small village on the left bank, as these remarks are old.

The river is navigable for vessels as far as the town of Palembang, by keeping close to the right or eastern bank; but when passing pulo Singris and the bank off Kampong Maya, the opposite shore should be taken. Both sides of the river are wooded, and on nearly all the isolated banks there are small trees, and on others fishing stakes, consequently there will not be much difficulty in avoiding them.

Freshets.—From November to March, the north-west monsoon period, rains prevail, and the wind varies from N.W. to N.E. At this period, sailing vessels belonging to Palembang either remain in port or trade to other places, as it is almost impossible for them at this period to make any progress up the river against the freshets. During a stay of five days off the town in January, the influence of the flood was not once felt. The ebb slackened during the day, but at night it often ran 5 knots. After much rain the freshets out of the river are felt as far as Muntok bay. (*See* rainfall, p. 16.)

Palembang, one of the largest Malay towns in the Archipelago, and the largest in Sumatra, derives its name from the many bridges across the numerous creeks that intersect it. A Dutch resident and other officials reside here, and to support their authority there is a

See chart, No. 2,597.

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military force. The population of the town is about 50,000, and the climate in the vicinity is considered so salubrious that convalescent soldiers are sent here from Banka.

Near the extreme end of the town, commanding the mouth of the Ogan river, is a large fort; there are several smaller forts some distance up the river.

Covered boats (called bedahs) daily arrive from the interior, laden with large supplies of cotton for exportation. This useful article grows quite wild some distance up the river, in some places close to the stream, and covering many miles of land. The greater portion of it is sent to Batavia.

All the necessaries of life are here found in abundance. The country abounds in large game, deer, wild pigs, &c., and the river with fish. Beef, fruit, vegetables, &c., are cheap and plentiful. The export trade consists principally of pepper, rattans, cotton, honey, dye woods, and gutta-percha.

Palembang is in connection with the Java sea southward of Lucipari point by creeks leading to the Lumpur and Masuji river, available for small trading craft. (*See* those rivers.)

Communication.—Palembang is in connection with Batavia, and Sumatra ports by telegraph. Mails from Batavia about every 9 days. (*See* also pp. 8 and 9.)

Trade.—Shipping.—*See* value of trade, p. 8. 113 vessels entered the Palembang in the year 1894. Of these 53 were Netherlands India vessels, one Dutch, two Chinese, and 77 British India or Straits Settlements.

Sungi Banju Asing, which lies close to the westward of Palembang river, is said in the Seaman's guide round Java, p. 267, to offer the best route to Palembang, being at all times navigable for vessels of heavy draught. At the entrance, in mid-channel there are depths of 8 to 10 fathoms. Higher up this river the Pontian and Jarang channels, though very narrow, are stated to be as good as that through the Palembang. As this river is not buoyed, whilst the Palembang is, it is probable the Asing has been found to be less available than the Palembang.

Directions.—The following remarks are very old, and an endeavour should be made to obtain a pilot by any vessel wishing to enter this river. To enter Sungi Banju Asing, from a position in which Monopin hill bears N.E. by E., and False point N.W. by N.,

See chart, No. 2,597.

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steer in a S.W. direction, according to the state of the tide. The ebb runs strongly towards the banks fronting the Palembang and the flood towards the inner banks on the western shore of the river.

Having reached Api point, take the mid-channel, between the beacon-poles, towards Bayam point, and then keep rather towards the Laga point side, round which the Pontian channel is entered. With a flood tide keep on the eastern shore, as the stream runs with force past that channel ; taking care, at the same time, to avoid the shoals which surround the point. In this river care is necessary when passing the points, as from most of them project small mud-banks.

Pontian and other affluents.—The junction of Pontian, Kietjar, Gassing, and Sebalick rivers, which last unites Pontian to Jarang river, causes a part of the ebb to run from the first two rivers, through Sebalick, and compels sailing vessels having come so far with the flood to anchor, and wait for the ebb.

Pontian river is generally deepest on its western side, except near its mouth, where the greatest depth is in the middle ; but again towards the western side, higher up, and in front of the shoal off the point, between Kietjar and Sebalick rivers. When near its junction with Sleino and Jarang rivers, keep close to the eastern shore, in 6 to 8 fathoms, to avoid the reef which projects from the point between Sebalick and Jarang.

When there is no wind it is necessary to anchor and wait for the flood coming up by Sleino river, in order to proceed up Jarang, and it will be found that a great part of the flood goes into Tambangadin river, while that going up Jarang is very trifling Having reached Jarang Kechil, anchor again till high water, to wait for the ebb from this river, which will soon take the vessel into the Palembang. Remarks on the freshets (page 399) apply also to these.

Jarang bank.—The bank off Jarang river is very shallow, but on the north side there is a narrow passage with 5 or 6 fathoms. Vessels of less draught than 15 feet can also find a passage on the south side.

COAST.—Batakarang point, the north-west boundary of Banka strait, lies about 30 miles north-westward from Fourth point, and

See chart, No. 2,597.

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may be identified by a group of trees, 130 feet high, which gives it a bluff and jagged appearance. False point is more sloping and flat, and lies about 9 miles to the south-eastward of Batakarang point.

The mudbank projects 7 miles northward from Batakarang point, 4 miles north-eastward of it, and 2 miles off False point; thence trending south-westward, bounding the entrance of Sungi Banju Asing on its north-west side, to Tanjong Kampeh, from which it projects not quite a mile.

The soundings off Batakarang point are regular, and the point may be passed in from 5 to 6 fathoms water.

EASTERN SHORE OF BANKA STRAIT.

The south coast of Banka, which separates Banka and Gaspar straits, is treated of here, as being intimately connected with the former, for it has been observed that at the entrance of Banka strait, in the south-east monsoon, the ebb stream during the night at springs will be found setting to the south-eastward; consequently many vessels, although steering a course for the strait, get set between Dapur islands and Baginda point.*

The coast between Tanjong Baginda and Dapur islands, about 14 miles in length in a westerly direction, is generally low, and covered with trees; it presents, however, some points sloping down from hills of moderate elevation, and is fronted with a mudbank extending in places nearly 2 miles from the shore, upon which are many rocks, above and below water.

COAST.—Baginda point, the south-eastern extreme of Banka, slopes gradually in a south-easterly direction from a hill 387 feet high. Two miles within is Baginda peak, 521 feet high.*

Duya point, 2 miles south-westward of Baginda point, is separated from it by a bight half a mile deep. At one mile within this point is a hill 432 feet high.

Tanah-robu point, nearly 10 miles westward of Duya point, has several rocks, above and below water, projecting nearly a mile off.

Banks.—Rocks, some of which are above water, extend southward of Duya point and for more than a mile along the coast west-

See chart, No. 2,149.

* For description of coast eastward of Baginda point, *see* p. 434.

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ward, to the distance of half a mile. The east end of a sandbank lies about 1½ miles southward from Duya point, and extends westward, joining the mudbank which fronts the coast to the distance of one mile, as far as Tanah-robu point, where it terminates; on this sandbank are several rocky patches.

Belayer reef is above water, and lies on the outer edge of the bank just mentioned, and S.W. by W. distant 1¾ miles from Keyang point.

Dapur point lies under Toboali Lama peak, and forms the south-western extreme of Banka. Adjoining Dapur point is a rock 40 feet high, with smaller rocks above water on both sides of it.

From a distance of 7 to 10 miles the rocks on Dapur point appear like a large town, showing out white against the trees in the background.

Dapur islands, two in number, are about a cable in diameter, and connected at low water by rocks; they are situated about one mile from Dapur point, and form the south-eastern limit of the entrance to Banka strait. The southern one, 120 feet high, is fronted by a sandy beach; rocks above water lie about one cable to the southward, and a rock under water about 2 cables south-eastward of the islet.

There is a channel half a mile wide, with depths of 5½ fathoms between Dapur islands and point; thence to Nangka point there are several white rocks lying close to the shore.

The bottom, off the south end of Banka, is very irregular, and composed of long sand ridges, with deep water over a muddy bottom between. None of these banks have less apparently than 5 fathoms on them, with the exception of one, the west end of which lies S.E. distant 1⅓ miles from Dapur islands; it thence extends about 5 miles to the eastward, where there are several patches of 3½ fathoms over a sandy ground. At about 4 miles E. by S. of these patches, and separated by deeper water, is a bank of 4 and 4½ fathoms, coral and sand, extending in an easterly direction for 3 miles; it appears to be a continuation of Dapur bank, and from its shoalest part Baginda point bears N.E. ¾ N., distance 7 miles. Isolated patches of 5 fathoms will be seen on the charts more in the offing.

LIGHT.—On the southernmost islet, from an iron framework on a white stone dwelling, is exhibited, at an elevation of 55 feet above

See charts, Nos. 2,597 and 2,149.

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high water, a *fixed white* light, visible in clear weather from a distance of 12 miles.

Overfalls.—At full and change, tide rips and overfalls occur, caused by the meeting of the ebb stream from Banka and Gaspar straits over an uneven bottom.

TOBOALI BAY.—Nangka point, the south-east extreme of Toboali bay, lies 2 miles north-west from Dapur point, and the coast between is fronted by rocks, extending about half a mile off shore. The 3-fathoms edge of the mudbank is nearly one mile off Nangka point, and is steep-to. The point may easily be distinguished by a round hillock over it 264 feet high, and also the land receding, forming Toboali bay ; the shore of the bay is low, and fringed at high water with sandy beaches within the mud flat, which here extends 2 miles off shore.*

Toboali Lama is a hill of pyramidal form, 512 feet in height, situated 1½ miles eastward of Nangka point.

Toboali point, 213 feet in height, and distant 5½ miles north-westward from Nangka point, has several white rocks near, and a conspicuous single tree on its summit.

Toboali fort, with its red-roofed barracks, stands half a mile south-east of Toboali point, upon a mound 60 feet in height, at the right point of entrance of a small river. At low water the river dries to a distance of 3 cables from its mouth.

The village of Sabang is situated close to the fort, and contains mixed population of about 600 Malays and Chinese. A Dutch Administrator, and a Captain with a small military force, garrison the fort, which is situated in lat. 3° 0′ 48″ S., long. 106° 27′ 25″ E.

Hills.—Aspect.—Mount St. Paul, 5 miles within Toboali point, rises with a gradual acclivity on its south-eastern shoulder to a peak 990 feet in height, with two others adjoining of nearly the same elevation ; the western peak terminates rather abruptly in a lower spur in the direction of Gadong peak. When westward of Puni island, owing to a projecting spur from the middle peak, the eastern peak of St. Paul is hidden, and the western one then appears the highest, and forms, with the north-west brow, a saddle hill.

Gadong peak is pyramidal, 593 feet high, and lies nearly 2½ miles westward from mount St. Paul ; it is a good landmark.

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* *See* charts, Nos. 2,597 and 2,808.

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Gosong point lies 4 miles north-westward of Toboali point, the land between forming a deep bight with mangrove trees. A stream falls into the sea on the north side of the point.

From Gosong to Labu point the land is more elevated, the highest part being 250 feet in height, with rocky points and sandy beaches, between which are numerous rocks close to the shore.

Puni islet, lying midway between Gosong and Labu points, is small, 47 feet in height, and conspicuous from the white granite rocks forming its base, and other rocks of a similar appearance near it.

Labu point, distant 12 miles north-westward from Nangka point, may be considered the western extreme of Toboali bay. A hill, 250 feet high, lies about one mile eastward of it, and another, about the same height, the same distance northward. This point from the south-eastward presents a shelving appearance, with large white rocks extending from it; from the westward these rocks have the appearance of a village, from the contrast they offer to the green verdure of the point.

The anchorage in Toboali bay is off the fort in 4 fathoms, mud, with Toboali Lama peak bearing S.E. by E. ½ E., and Gadong peak in line with the fort N.E. ½ N.; small craft may approach on the latter bearing nearer the shore as the soundings decrease regularly. This bearing also leads into the anchorage, from Stanton channel, southward of the banks. In southerly and south-westerly winds there is a heavy swell here which makes landing difficult.

Supplies.—Water and wood may be obtained here; the former from the river, or from a small stream half a mile eastward of it, from half flood to half ebb. Medical assistance may be obtained here by application to the Dutch authorities.

Dawon point is situated 7 miles north-westward from Labu point, and the shore between is low and covered with mangroves; a range of hillocks extends parallel to the coast, the highest of which is elevated 230 feet; there are also several streams.

The land at Dawon point attains a greater elevation, and is faced with sandy beaches and rocky points. At 4½ miles within the point is a round wooded hill, 315 feet in height.

See charts, Nos. 2,597 and 2,808.

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Sail tree.—Close to the coast, 2 miles northward from Labu point, is a clump of trees, one of which (Sail tree) is or was a conspicuous square tree, 167 feet high, there being no others of the same elevation near it.

Pulo Dawon, 30 feet in height, is one of a cluster of rocks lying off Dawon point, nearly all of which are covered at high water.

LIGHT.—On pulo Dawon, from an iron framework on a white stone dwelling, is exhibited, at an elevation of 44 feet above high water, a *fixed white* light, visible from a distance of 10 miles.

Panjang hill rises close to the coast between Dawon and Banka points. When seen from the south-eastward it shows as a wedge, with its greatest elevation, 316 feet, on the eastern end. From the north-westward it appears as a long hill rising to a peak near its centre.

Water.—A stream of fresh water runs close to the north side of this hill; the coast between it and Banka point is low and covered with mangroves, off which there are several ledges of rocks.

Banka point and hill.—Banka point is about 60 feet high; at 1½ miles northward is Banka hill, which from the south-eastward appears of similar shape to Panjang hill, but differs in having the highest part on its western extremity. From the north-westward it shows with a flat top, and is about 256 feet in height.

Pulo Besar, nearly connected with Banka point by rocks, is one-third of a mile in extent.

LIGHT.—On the centre of pulo Besar, from an iron octagonal lighthouse 202 feet in height, the lower part of which is painted white and the upper brown, with a white cupola, is exhibited at an elevation of 196 feet above the sea, a *fixed white* light, visible 20 miles in clear weather; it is not visible northward of Lalari point (of the bearing S. 74° E.).

The Coast, from the foot of Banka hill, trends westward to Lalari point, is covered with mangrove trees, and assumes the usual irregular outline of such coasts. The trees upon Pudi point, nearly midway, form two mounds, with a small gap between them.

See charts, Nos. 2,597 and 2,808.

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Mamelon hummock is a small round hill 256 feet high, standing by itself 3 miles inland within Pudi point.

LALARI (Pangong) point, 75 feet high, is covered with trees, and presents a bold bluff appearance on all bearings in the strait.

Anchorage.—Good anchorage may be obtained, in about 7 fathoms, mud, with Lalari point bearing S.E. ½ E., and Brani point N. ¾ W.

A mud bank fronts the whole coast between Dapur and Lalari points. The 3-fathoms line may be considered to mark its edge, which, in most places, shoals very quickly within that line. It extends from a half to one mile off the points, from 2 to 2½ miles off the bights, and is steep-to; it should not be approached within a depth of 10 fathoms. Between Toboali and Labu points, are several narrow isolated banks about 2 miles in length, with depths of from 2 to 3 fathoms, lying parallel to and nearly midway between the shore mudbank and the sandbank forming the eastern limit of Stanton channel.

Casuarina point, 123 feet high, lies nearly midway between Lalari and Brani points. The coast between is low, with sandy beaches at high-water mark; several hills, from 300 to 400 feet high, are situated from 3 to 4 miles inland.

Brani point, 11 miles northward from Lalari point, is a termination of a spur from the Parmassang range, with a conical peak 516 feet high, showing very prominently both from the northward and southward.

Timbaga or Copper rocks, so named from their reddish colour, are three small rocks, lying east and west of each other, about one cable in extent. The highest and westernmost rock is 4 feet high, with Brani point bearing N. by E. distant 3 miles. Shallow water, about half a mile in breadth, extends nearly half a mile northward of the group, and 2½ miles to the southward, between which and the mudbank fronting the Banka coast are depths of 5 to 9 fathoms.

Patches of coral and sand, about a cable apart, with 2 fathoms least water, and 8 fathoms close to, lie 1⅓ miles W.N.W. from these rocks, but they are all within the 10 fathoms line, the depth vessels are cautioned not to go within when passing them. In approaching them the depths shoal suddenly from 20 to 10 fathoms.

See charts, Nos. 2,597 and 2,808.

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From the middle patch of 2 fathoms, Timbaga rocks appear nearly in line with a sharp peak, 330 feet high, south of Bukit Limmaun; and the apex of Riah hill, 657 feet high, is just open westward of a white rock off Tanjong Bedaau.

A rocky bank, about a mile in extent east and west, and half a mile north and south, having 7 to 9 fathoms water, and 14 to 20 fathoms close-to all around, lies W.N.W. of the shoal patches just mentioned.

Clearing mark.—Lalari point, bearing S.E. ¼ S., leads westward of Timbaga rocks, of the 2 fathom patches, and also just to the westward of the rocky bank.

Water may be procured at a stream about half a mile to the northward of Timbaga rocks, from half flood to half ebb, after which the mud prevents a boat approaching near the shore.

Parmassang range is a chain of hills extending from Brani point in a north-east direction for nearly 7 miles; the highest peak, near the centre, rises to an elevation of 1,608 feet.

Tanjong Bedaau is a bold headland, 3 miles northward of Brani point; a conspicuous white rock, 45 feet high, lies immediately off it.

Pulo Pemain is a small round island, 59 feet high, lying on the edge of the mudbank, 2 miles north-westward from Tanjong Bedaau.

Tanjong Karra, 171 feet high, lies 3 miles north-eastward of Tanjong Bedaau; rocks, some above water, extend more than half a mile off this point.

Slan bay is a deep shallow bight, about 8 miles across, in which are the Banka Kota and Slan rivers.

Slan is the chief town of a district, and is municipally governed by the administrator of the tin mines; here, as at all other chief towns of districts, a small number of Dutch troops are stationed.

The edge of the shore mudbank lies nearly one mile off Lalari point, and a little less than half a mile off Casuarina and Brani points. Pulo Pemain stands on its outer edge, thence the bank

See chart, No. 2,597.

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assumes somewhat the form of Slan bay which it fronts, and surrounding Great Nangka islands trends towards Tanjong Tedong, from which it extends a little more than one mile.

Northward of Timbaga rocks the bank may be approached to 8 fathoms, as far as two miles northward of pulo Pemain, when vessels may stand into 7 or 6 fathoms until near Nangka islands, which should not be approached on the west side within the depth of 12 fathoms.

NANGKA ISLANDS, three in number, lie about the middle part of the strait, 1½ to 3 miles distant from the coast of Banka island, and 8 to 9 miles eastward of Third point on the Sumatra coast. Great Nangka, 285 feet high, is 1¾ miles in length north and south, by 1¼ miles in breadth; Middle and West Nangka are each about half a mile in length, the former, on which is the lighthouse, being 125 feet, and the latter 205 feet high.*

Great Nangka is nearly half a mile within the edge of the mud-bank which extends from the Banka shore. A rock awash at low water, lies 3 cables West of the north point of the island.

From Middle Nangka a bank of 2 to 3 fathoms extends S.S.E. 1¼ miles; from West Nangka a similar bank projects southward nearly one mile; and S.S.E. distant three-quarters of a mile from its extreme is a 3¼-fathoms patch.

A small flat rock, 6 feet high, named West reef, lies 1½ cables off the west end of West Nangka; and another 32 feet high, named Tree rock, lies 3 cables south-eastward of Middle Nangka.

North reef, with some rocks above water lies 2 cables off the north end of Middle Nangka, the mudbank extending in the same direction about a quarter of a mile beyond.

Between the banks which surround the islands are intricate channels from 2 to 4 cables wide, having depths of from 4 to 7 fathoms.

Water.—There is a watering place on the west side of Great Nangka, and another and smaller stream on the north-east side; but they are frequently dry in the south-east monsoon season, and owing to the mudflats surrounding the islands, the watering places are difficult of approach by boats.

LIGHT.—On West Nangka from a white iron tower, 115 feet in height, is exhibited at an elevation of 215 feet above high water, a

* *See* plan of Nangka islands, on chart No. 2,149.

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flashing white light, with a period of *half a minute*, visible from a distance of 20 miles in clear weather. The duration of the flash is three seconds.

Anchorage.—The south extreme of Great Nangka bearing E. ½ N., leads about half a mile southward of the bank extending S.S.E. of the Middle Nangka; and Tree rock N. by W. ¼ W., leads westward of the mudbank off the west side of Great Nangka, at nearly the same distance. A vessel can anchor, with both these bearings on, in 5 fathoms, and be about 1¼ miles from the watering place; she should, however, approach this position with caution, and not attempt to go closer in.

Tides.—During the north-west monsoon it is high water, full and change, at Nangka islands at 7h. a.m., and the rise is about 10 feet. Many eddies and small races will be met with in the vicinity of these islands, caused by the flood stream from the China sea meeting the flood from the southward. *See* also pp. 394 and 421.

COAST.—Tanjong Tedong, lying about 2 miles northward from Great Nangka, is a conspicuous point 234 feet high. A large cluster of rocks, some above water, lie about one mile north-westward of the point, at a short distance within the edge of the shore mudbank.

The coast from Tanjong Tedong trends north-eastward into a bay, at the bottom of which is the Sungi Sembulan; thence it curves north-westward to Tanjong Penegan, from which it recedes about one mile to the entrance of a small river of that name. The coast line from this river rounds the foot of the higher land sloping down from Mundo peak, and thence to Mundo point, when it again bends to the north-east for 1½ miles to Sungi Mundo.

Meddang islands are three in number, lying about 3 miles off the entrance of Sungi Mundo, and forming the south-western extreme of Mundo bay, being joined to the main land by the mudflat. The largest island is 147 feet high. Pulu Antu, 83 feet high, lies about 1½ miles north-eastward of Meddang islands.

Mundo bay lies between Sungi Mundo and Tanjong Jurung-patt, 240 feet high, 8 miles north-westward. The shore of this bay is low, and covered with trees, which, at the entrance of Sungi Kota

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See chart, No. 2,597.

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Waringa, are about 120 feet high. The land near Tanjong Jurung-patt becomes more elevated, and continues so as far as the entrance of Sungi Jiring.

Tanjong Raya and Sungi Tempelang lie between Jurung-patt and Sungi Jiring. Close off the coast is pulo Sumbayang, 175 feet high.

Jiring bay is the deep bight, 9 miles in length, between Tanjong Rensang and Tanjong Padah; at its head is Sungi Jiring. The shore of the bay is low, but Tanjong Padah, 203 feet high, is readily recognised, the land on both sides being lower and curving into two bays, giving it a prominent appearance.

Tanjong Anisi.—Between Tanjong Padah and Tanjong Puni, about 8 miles apart, there are two bays, each about three-quarters of a mile deep, with Tanjong Anisi having a hummock 256 feet high, midway between.

Karang Saribu, a cluster of rocks, some above water, extend 2 miles from Tanjong Anisi.

Tanjong Sukal, 2 miles eastward of Tanjong Puni, has a hill 209 feet high, and a small stream on its west side.

Tanjong Puni is low, and the coast line rounds away gradually on either side. Thence to Tanjong Kalian, 11 miles west-north-westward, the coast recedes and forms Muntok bay, about 2 miles deep.

Landmarks.—There are several hills from 100 to 600 feet high on the part of the coast just described, between Tanjong Tedong and Sungi Mundo; Mundo peak, 512 feet high, eastward of Meddang islands and the lighthouse on West Nangka, are convenient objects for determining the position of a vessel.

At 3 miles north-eastward from Tempelang river entrance is Bukit Tempelang, 412 feet high, north-westward of which is Bukit Pandin, 585 feet high, a useful mark when in this part of the strait.

Bukit Assam, a solitary sharp peak, 661 feet high, standing by itself, 10½ miles northward of Tanjong Padah, is also useful as a landmark.

Four or 5 miles inland between Tanjong Puni and Muntok are some hills, one of which, Bukit Belu, 773 feet high, serves as a clearing mark for Karang Brom Brom and Amelia bank.

See chart, No. 2,597.

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Monopin hill rises near the west end of Banka; its summit being 1,456 feet high, may be seen at a considerable distance, and serves as a guide in approaching to or departing from the north end of Banka strait. It frequently happens that this hill is the only visible object, especially when a vessel is near the Sumatra shore in 5 or 6 fathoms water.

BANKS.—The edge of the mudbank fronting the shore, with depths of less than 3 fathoms, extends a distance of one cable off the rocks off Tanjong Tedong, and one mile beyond the Meddang islands. It also fills the whole of Jiring bay, and extends about 2 miles southward of Tanjongs Tadah and Puni, whence it follows the curve of the coast line at an average distance of about $1\frac{1}{4}$ miles until abreast the point eastward of Muntok, from which it is distant only half a mile.

Between Tanjong Tedong and Tanjong Tadah, the depths decrease regularly towards the shore bank, which may there be approached to 5 or 4 fathoms, except near Meddang islands, where a vessel should not shoal under 5 fathoms. At Tanjong Tadah the bank begins to get steeper-to, and abreast of Karang Saribu, there are depths of 9 and 10 fathoms close to its edge.

Clearing mark.—Mundo peak, well open to the southward of Meddang islands, leads southward of this bank as far westward as Tanjong Tadah.

The bank south of Tanjong Puni is shallow and steep-to, having from 11 to 16 fathoms, almost close to its edge. Tanjong Tadah bearing E.N.E. leads just south-eastward of this spit; and Monopin hill, N.W. by N. leads just westward of it.

Karang Brom Brom is composed of rocks and sand, dry in places at low water, with one or more bushes growing on one spot, and lying $4\frac{1}{2}$ miles southward from Tanjong Sukal. It is a little more than 2 miles in length in an east and west direction, and nearly half a mile in width at its western end, where the rocks are, and from which Monopin hill bears N.W. $\frac{1}{2}$ N.; the eastern end tapers away to a sandy point. The buoy has been removed as a portion of the bank is above high water.

The highest part of Tanjong Anisi bearing N. $\frac{1}{4}$ E., or the highest part of Tanjong Tadah bearing N.E. $\frac{3}{4}$ N., leads half a mile eastward of the shoal; and Bukit Belu, bearing N. $\frac{3}{4}$ W., leads nearly a mile westward of it.

See chart, No. 2,597.

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A channel 2 miles wide, having 7 to 15 fathoms water, lies between Karang Brom Brom and the shore mudbank. A vessel may easily be worked through this channel by day, during the westerly monsoon, by taking advantage of the tidal streams, whereas on the coast of Sumatra a strong easterly stream runs with little interruption; it must, however, be borne in mind, when standing towards Tanjong Puni, that the shore bank is steep-to, there being depths of 11 to 16 fathoms close to its edge.

Amelia bank is a small patch of hard ground, with $2\frac{3}{4}$ fathoms water, at the south-east extreme of Muntok bank; it is connected to the shallow patches of that bank by a ridge having 4 to 5 fathoms water. From Amelia bank the western extreme of Karang Brom Brom bears East, distant $4\frac{1}{2}$ miles.

Bukit Belu bearing N. $\frac{1}{4}$ E. leads one mile eastward of Amelia bank; and the same hill N. by E. $\frac{1}{4}$ E. leads the same distance westward. The dry portion of Karang Brom Brom bearing E. by N. leads southward of the bank, which should not be approached under a depth of 10 fathoms.

Muntok bank extends from Amelia bank in a direction nearly parallel to the shore for a distance of $10\frac{1}{2}$ miles, to within a third of a mile of Karang Haji, off Tanjong Kalian. It is composed of hard sand, and has several patches of $2\frac{1}{2}$ to 3 fathoms water, and 4 or 5 fathoms between, for which see the chart.

The deepest water across the bank appears to be with Muntok fort flagstaff in line with the pier head, bearing N. by E. $\frac{1}{4}$ E.

An isolated $2\frac{1}{2}$-fathoms patch near the west end of the bank lies with the lighthouse on Tanjong Kalian bearing N. $\frac{1}{4}$ E., $1\frac{1}{3}$ miles, from abreast which, depths of 5 fathoms may be obtained towards Karang Haji until very close to it, when the water will suddenly deepen to 11 to 20 fathoms. Monopin hill in line with the lighthouse on Tanjong Kalian, N.E. by N., leads westward of the $2\frac{1}{2}$-fathoms patch, between it and Karang Haji.

Working through the strait, and standing towards Muntok bank, vessels should not bring the lighthouse on Tanjong Kalian to bear westward of N.N.W. $\frac{1}{2}$ W., when northward of Amelia bank.

Karang Haji is a reef of rocks and sand lying close to the north-west end of Muntok bank; the rocks are all covered at high

See chart, No. 2,597.

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water, but many are visible at half ebb. The reef is 1½ miles in length in an east and west direction, and half a mile in breadth, and from its western and outer extreme Tanjong Ular is in line with Tanjong Bersiap, the latter distant about 4 miles. Close-to on the north, west, and south sides are irregular depths of from 16 to 20 fathoms.

Tanjong Ular lighthouse kept well open westward of Tanjong Bersiap leads westward of this reef; the highest part of Monopin hill in line with Tanjong Kalian lighthouse leads eastward of it; and Tanjong Puni bearing E. ½ S., leads to the southward.

Buoy.—On the north-west edge of Karang Haji lies a white nun buoy in 4½ fathoms.

A rock, with 2 fathoms water, lies about 2 cables northward of Karang Haji, with Tanjong Bersiap bearing North, and Tanjong Kalian lighthouse E. ¼ N.

Binnen bank is a spit of hard sand, with 2½ fathoms water and 7 or 8 fathoms close-to, extending 1¾ miles eastward from Tanjong Kalian.

Two-thirds of a mile E. by S. from this spit is a 3-fathoms patch, from which Muntok pierhead bears N.N.W. ¾ W., distant two-thirds of a mile.

TANJONG KALIAN, low and sandy, with some trees behind it, is the south-west extreme of the west end of Banka. About three-quarters of a mile north-westward is Tanjong Brani, with trees about 127 feet high.

LIGHT.—The lighthouse upon Tanjong Kalian is a white stone tower with a red lantern with white roof, from which is exhibited, at an elevation of 170 feet, a *fixed white* light, visible in clear weather from a distance of 20 miles.

Kalian ledge is a small reef, with one fathom water, lying a little more than one mile N.W. by W. of Tanjong Kalian.

A black buoy lies in 4¾ fathoms on the south side of Kalian ledge, and marks the north-east side of Kalian pass.

Kalian pass, between Tanjong Kalian and ledge and Karang Haji, is three-quarters of a mile wide, with depths of 25 to 32 fathoms. This channel is generally used by vessels coming from the northward and proceeding to Muntok bay, and with a fair wind is preferable for sailing vessels to the passage southward of Karang

See chart, No. 2,597.

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Haji ; but the great depth, bad anchorage, and strong streams render it unadvisable to attempt to work through.

Kalian lighthouse, bearing E. by S., leads through between Kalian ledge and Karang Haji ; the sandy point upon which the lighthouse stands may be passed tolerably close-to.

MUNTOK.—At 2 miles eastward of Tanjong Kalian, on the banks of a small river, is the town of Muntok, the capital of Banka island, having a fort upon a hill, and some stone houses close to the shore, the red roofs of which are visible at a distance. The Resident and other Dutch officers have houses on the hill near the fort, most of the native houses being nearer the sea.

The population of Muntok consists of about 100 Europeans, mostly Dutch, and 9,000 Malays and Chinese. The island of Banka has a population of about 200 Europeans, 50,000 Malays, and 20,000 Chinese.

Trade.—Shipping.—For value of trade, *see* Rhio, p. 8. 90 vessels entered Muntok in the year 1894 ; of these 8 were Netherlands India vessels, 1 Dutch, 64 Singapore and 17 Chinese.

Pier.—A pier nearly half a mile in length extends from the western point of the river, with a depth of 5 feet at its extremity at low water. There is a small camber, westward of the pier, where small trading vessels load and discharge.

LIGHTS.—A *fixed red* light is exhibited from the outer extreme of the pier ; and a *fixed white* light is shown from a wooden tower, painted white, on the inner extreme of the pier, visible about 8 miles in clear weather.

Supplies.—Coal may be obtained here from the Dutch Government by application to the harbour master, but it is tedious to get off, there being only one lighter. Ships' boats can coal from the pier at any time. Provisions are dear, with the exception of fowls. Medical assistance may be had by application to the Governor.

Communication.—Mail steamers running between Batavia and Singapore call here every 9 days. Muntok is in telegraphic communication with Sumatra ports and Batavia ; thence with all parts. *See* pp. 8 and 9.

Anchorage.—The best anchorage for vessels in Muntok road is in 6 to 10 fathoms, about 1¾ miles from the shore, with Monopin hill

See chart, No. 2,597.

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bearing about N. by E., and Tanjong Kalian from W.N.W. to W. by N. The ordinary anchorage of the Dutch man-of-war stationed in Banka strait, and of the merchant vessels trading to Muntok, which are usually of a small class, is in 4½ or 5 fathoms, inside the 3-fathoms patch lying off the spit which outlies Binnen bank, at any convenient distance and direction from the pierhead.

When the entrance to the river is dangerous, a blue flag is hoisted at the harbour master's office at the inner end of the pier.

Directions.—The usual route to Muntok road is across Muntok bank. A vessel coming from the northward and bound for the road, may proceed either through Kalian pass, or she may pass outside Karang Haji and then follow the usual track across Muntok bank. A good mark for crossing the bank is Monopin hill in line with the flagstaff on the fort bearing N. by E. ¼ E., which leads in 5 to 6 fathoms water; another good mark is Monopin hill in line with the lighthouse N.E. by N.

No vessel can cross the bank in safety with Monopin hill bearing to the westward of North. When over the bank, the water will deepen to 18 or 20 fathoms, soft muddy bottom, and shoal again quickly towards the shore.

Working in from the southward over Muntok bank, keep Monopin hill between N. ¼ E. and N.N.E.

Working into Muntok road from the eastward a vessel should keep between the shore and Muntok bank, being careful not to bring Tanjong Tadah to the eastward of E.N.E., until Monopin hill bears N.W. by N.

A hard sandy bottom and shallow water will be found when near the edge of Muntok bank; while, to avoid the shore bank, Monopin hill must not be brought westward of N.W. by N., and taking care not to shoal to less than 5 fathoms.

Tides.—It is high water, full and change, at Tanjong Kalian during the north-west monsoon at about 8h. a.m., and in the south-east monsoon at 8h. p.m.; springs rise 12½ feet.

Tanjong Bersiap, 168 feet high, lies 3 miles northward of Tanjong Kalian. The coast between is fronted by a bank extending nearly a mile off, with from 7 to 10 fathoms close-to. Within the edge of this bank, and lying some distance off Tanjong Bersiap, is a cluster of rocks, some of which are above water.

See chart, No. 2,597.

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Bersiap hill, 336 feet high, is small, isolated, and stands about 1½ miles within the point.

TANJONG ULAR, 156 feet high, lies about 4 miles northward from Tanjong Bersiap, the coast between forming a bay about one mile deep; nearly in the centre is a yellowish cliff. A reef, with rocks above water in places, extends nearly one mile off Tanjong Ular.

LIGHT.—From an iron lighthouse, 42 feet in height, painted white, erected on Tanjong Ular, is exhibited, at an elevation of 52 feet, a *white flashing* light, with a period of *half a minute*, visible in clear weather about 5 miles.

Ular reefs is the name given to the rocky and uneven ground, with rocks above water in places, extending from one to 1½ miles off shore between Tanjong Bersiap and Tanjong Ular.

Transit rock lies at the western extremity of this rocky ground, at 2¼ miles off shore, and 8 cables westward from O'Flaherty reef which is uncovered, except at high water spring tides, with depth of 6 to 10 fathoms between them. The least depth on the rock is 2 fathoms, with Tanjong Ular bearing N.E. by E. ¼ E., and Monopin hill E. by S. ⅔ S. There is a depth of 5 to 14 fathoms over irregular bottom around the rock, and 20 fathoms at one cable westward of it.

A rock, awash at low-water springs, lies E. ½ N. 2 cables from Transit rock; and a patch of 4½ fathoms (perhaps less) rocky bottom, at half a mile northward of Transit rock, with 20 fathoms close-to; the latter is indicated by strong ripples.

Clearing marks.—Tanjong Brani, bearing S.S.E. ½ E., leads westward of Transit rock; and Tanjong Biat, bearing E.N.E., leads northward.

A rocky patch of 7 fathoms, lies nearly midway between Transit rock and Frederick Henry rocks, with Kalian lighthouse bearing S.E., distant 8½ miles.

TANJONG BIAT, 3 miles north-eastward from Tanjong Ular, has rocks above and below water, extending nearly one mile off.

See chart, No. 2,597.

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Sebidung Uma, a rocky patch of 3 fathoms or less, lies 1¾ mile off the coast, midway between Tanjong Ular and Tanjong Biat, with depths of 10 to 12 fathoms between it and the shore bank.

As this bank is steep-to, great caution is necessary when navigating in this locality.

Ular lighthouse bearing S. by E. ½ E., leads half a mile westward of Sebidung Uma; and Bukit Batu, a hill 708 feet high, about 12 miles eastward of Tanjong Biat, bearing E. ½ S., leads one mile northward of it.

FREDERICK HENRY ROCKS lie at the northern entrance of Banka strait, nearly midway between Batakarang point on the Sumatra coast and Transit rock off the Banka coast. They consist of two rocky patches, lying north and south of each other, having 9 feet on the northern patch, and 3 feet on the southern. The two patches occupy a space about one mile in length and half a mile in breadth.

From the 3-feet patch, Monopin hill bears E. ¾ S. 14 miles; and the lighthouse on Tanjong Kalian S.E. by E. ½ E. 12½ miles.

Close around the rocks the depths are 16 to 20 fathoms, except to the southward, where a bank with depths of 8 to 10 fathoms stretches about one mile southward of the south patch.

Buoy.—A red buoy, surmounted with a staff, and the letters F.H. on a vane, is moored in 5 fathoms on the north edge of the 3-feet patch.

Clearing marks.—Monopin hill, E. ½ S., leads about half a mile southward of the 3-feet patch; and Monopin hill in line with the yellowish cliff between Bersiap and Ular points, E. by S. ¾ S., leads 2 miles northward of the northern patch.

STANTON AND LUCIPARA CHANNELS.

STANTON CHANNEL.—General remarks.—Buoyage.*—Stanton channel, the eastern and best entrance to Banka strait from the southward, is 19 miles in length, and nearly 3 miles in breadth at its narrowest part, with depths in mid-channel increasing gradually from 7 fathoms at its south-eastern entrance to 20 fathoms near the other extreme. It is both lighted and buoyed, though too much

* *See* chart of Banka strait, No. 2,597; also south entrance to Banka strait, No. 2,808.

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dependence must not be placed on the latter maintaining their assigned positions. (*See* intended system, p. 9.)

The approaches from the southward are marked by the well-defined mount St. Paul, the conical hills of Gadong and Toboali Lama, the lighthouse on the Dapur islands, and in fine clear weather by the more distant range of Padang; these cannot fail to point out the entrance, and the water being deep within half a mile of Dapur islands, will give strangers confidence in steering for the land. Prominent points and hills will also be seen along the Banka coast, bearings of which will enable a vessel at any time to ascertain her position.

The channel is bounded by narrow sandbanks, with a mixture of mud and sand between. The two marking the western boundary of the channel are named Smits and Melvill banks, after the late Lieutenants Smit and Melvill of the Dutch Royal Navy, whose valuable contributions to hydrography in the Java sea are so well known to seamen.

Smits bank consists of four smaller banks, nearly connected, and forming within the depth of 5 fathoms a narrow ridge 15 miles in length, with its shoalest part of 2 feet, lying 6 miles, and the next shoalest of 10 feet, about 3 miles from the north-western end; two other patches of 3 fathoms and $2\frac{3}{4}$ fathoms lie on the south-east part of the bank.

Buoy.—A buoy is placed about half a mile north-westward of the 10-feet patch.

Panjang hill, bearing N.E. $\frac{1}{4}$ N., leads north-eastward of Smits bank and between it and Nemesis bank, in 6 fathoms at low water. Gadong peak in line with Toboali point N.E. $\frac{1}{8}$ E., or Lucipara island S.W., leads south-eastward in 4 fathoms; the north-eastern side should not be approached under a depth of 10 fathoms.

Melvill bank, 5 miles in length, and nearly half a mile in breadth, lies a quarter of a mile eastward of the south-eastern part of Smits bank, with a depth of 7 and 8 fathoms between.

Buoy.—The shoalest part of this bank, 2 fathoms, marked by a buoy, is $1\frac{1}{2}$ miles from its north-western extreme.

Labu point bearing N. by E. $\frac{1}{2}$ E., leads south-eastward of the bank, in 7 fathoms; and Mamelon hummock just open of pulo

* *See* chart of Banka strait, No. 2,597; also south entrance to Banka strait, No. 2,808.

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Besar lighthouse, or in line with it, leads eastward of Melvill bank, in about mid-channel.

Between the above banks and Lucipara island, there are many other banks all trending in the same direction, with narrow deep water channels between; but as these channels are narrow, and no marks can be given to clear the banks, they are not available for vessels.

Eastern bank, marking the eastern side of Stanton channel, is 13 miles in length, and nearly one mile in breadth abreast Labu point. It is formed by three banks nearly joined together, with from $1\frac{1}{2}$ to 3 fathoms on the north-western, 4 feet on the middle, and $2\frac{3}{4}$ to 3 fathoms on the south-eastern bank.

Buoys.—The bank is marked by two buoys on its channel side, situated with Labu point bearing N.N.E. about 4 miles, and East about 6 miles.

Gadong peak, in line with Toboali fort, bearing N.E. $\frac{1}{2}$ N., leads southward of Eastern bank in $4\frac{1}{2}$ fathoms; and Mamelon hummock in line with pulo Besar lighthouse, bearing N.W. $\frac{1}{4}$ W., leads westward of the bank.

A bank of sand lies one mile westward of the south-eastern extreme of Eastern bank, but not less depths than $4\frac{1}{2}$ fathoms were found on it at low water.

Nemesis bank, lying in the fairway between Pudi point and False First point, is a ridge of sand extending 9 miles in a north-west and south-east direction, with irregular depths of 3 to 10 fathoms. A patch of 2 fathoms, the least known depth, lies with Lalari point bearing N.W. by N., distant $1\frac{3}{4}$ miles.

Buoy.—A buoy marks the north side of the 2 fathoms patch.

Casuarina point kept open of Lalari point bearing N. by W. $\frac{3}{4}$ W. leads westward of Nemesis bank, in 14 fathoms water; Mamelon hummock N. by E. $\frac{1}{4}$ E., leads eastward; and Lalari point bearing N.W. $\frac{1}{4}$ N. leads northward. A patch of 5 fathoms is situated 2 miles within its south-eastern extreme.

Anchorage may be found in any part of Stanton channel, but vessels bringing up with a kedge anchor must always be prepared to let go the bower anchor; as there will be experienced, particularly

* *See* chart of Banka strait, No. 2,597; also south entrance to Banka strait No. 2,808.

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during the change of the monsoons, very dangerous squalls, with heavy rain, thunder, and lightning, which generally lasts for about an hour.

Tides.—During the south-east monsoon, it is high water, full and change, at Toboali point, on the Banka shore, at 8h. 30m. p.m., and at 10 a.m. during the north-west monsoon; ordinary springs rise $10\frac{3}{4}$ feet, and sometimes 12 feet. The highest tide generally occurs two days after full and change. The rate at springs is $2\frac{1}{2}$ knots. The flood stream sets north-westward and runs for about 12 hours, and the ebb the same period in the opposite direction, but they are both sometimes influenced by the strength of the monsoon. When it is blowing strong from the south-east the flood stream often runs from 14 to 18 hours.

It is high water, full and change, at Labu point at 11h. p.m. in the south-east monsoon; ordinary springs rise 10 feet.

Northward of Lalari point, in the south-east monsoon the flood sets north-north-westward, and the ebb south-south-eastward, along the Banka shore.

The time of high water at Labu point being $2\frac{1}{2}$ hours later than at Toboali point in the southern part of Stanton channel, for a few days after full and change the tides will be found, (as there is generally 12 hours flow and ebb,) to run in one direction all night, and the opposite direction during the day, with a velocity of $2\frac{1}{2}$ to 3 knots. The stream sets directly in mid-channel, the flood north-westward, and the ebb south-eastward, so that sailing vessels may take advantage of it in light airs to drop through.

Directions.—Vessels from the southward intending to proceed into Banka strait by Stanton channel cannot fail, in approaching the coast of Banka, to recognise mount St. Paul by its flattish top having several nipples of nearly the same elevation, and Gadong and Toboali Lama peaks by their conical appearance. Should the weather be clear, the distant high range of Padang will be visible. The highest peak of this range is quoin-shaped, attaining from its western shoulder an elevation of 2,217 feet, with several lower hills of a rounder and more conical appearance adjoining, the two westernmost being about 1,200 and 1,400 feet high.*

Since the establishment of the lighthouses and the buoyage, steam vessels will have no difficulty in navigating Banka strait in the day time.

* *See* chart of Banka strait, No. 2,597; also south entrance to Banka strait, No. 2,808.

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Sailing vessels, after recognising mount St. Paul and Toboali Lama peak, should approach the latter on a North bearing, when Dapur lighthouse should shortly be visible. When about 3 miles from the lighthouse, steer about N.W. by W., allowing for tide, which course will lead in about mid-channel to abreast Banka point, between the buoys marking Eastern bank and those on Melvill and Smits bank: observing that Mamelon hummock (if it can be distinguished) just open of or in line with pulo Besar lighthouse, or the latter bearing N.W. ¼ W., leads well eastward of Melvill and Smits banks, and of the buoys marking them.

When off Labu point, the high range of Parmassang will be visible, rising from a gradual slope on its western shoulder to a flat top peak, with two lower peaks adjoining. The three hills, Banka, Panjang, and Woody, will also be seen; the two former may be known by their wedge shape and the latter by its isolated position.

When pulo Dawon lighthouse bears North, distant about 4 miles, steer about a point more to the westward, to pass about 2 miles southward of Lalari point and northward of Nemesis bank buoy; the lighthouses afford ready means of checking the position of the vessel. From Lalari point to Timbaga rocks the shore bank may be avoided by not shoaling under a depth of 10 fathoms. From Lalari point, *see* page 424.

At night.—Stanton channel being partly lighted is available for vessels of light or moderate draught at night, but it is preferable for those unacquainted with the channel to choose daylight.

Working through Stanton channel from the eastward, vessels may stand towards the south extreme of Dapur islands to a distance of half a mile, as these islands have deep water at 4 cables from them. Between this and Toboali the shore mudflat may be approached until Dapur lighthouse bears S.E. by E., and Lucipara island may be approached to a distance of 4 miles; but when Gadong peak comes in line with Toboali fort N.E. ½ N., pulo Dapur lighthouse must not be brought to the southward of E.S.E. to clear Eastern bank.

Parmassang peak kept eastward of pulo Besar lighthouse or Banka hill bearing N.W. ½ N. will lead northward of Melvill bank; and when Labu point bears eastward of N.E. by N., by not shoaling under 10 fathoms, all the banks on both sides will be cleared.

The shoal patch on Nemesis bank (marked by a buoy) should not be approached under a depth of 10 fathoms until Casuarina point

* *See* chart of Banka strait, No. 2,597; also south entrance to Banka strait, No. 2,808.

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comes open of Lalari point, and in rounding the latter point take care not to come into a less depth than 10 fathoms, as the bank is here steep-to. Timbaga rocks may also be avoided by following the same precaution, and from thence it is recommended to work up from Second point along the Sumatra coast.

These directions reversed will apply when working in the opposite direction.

LUCIPARA CHANNEL, from $1\frac{1}{2}$ to 2 miles wide, is the western entrance to Banka strait from the southward, and is marked by two buoys on its eastern side; the western side of the channel is bounded by the mudflat which projects from the coast of Sumatra for 2 miles or more; this flat may be approached by the lead until within about one mile of Green point, northward of which it is steep-to. This channel is not available for vessels of heavy draught.

Round shoal.—The southern sandbank in this channel is nearly 2 miles in length, and one mile in breadth. The least water, $1\frac{1}{2}$ fathoms, is near the centre, with the summit of Lucipara island bearing S.E. $\frac{1}{3}$ E. distant 8 miles.

Buoy.—A buoy marks the west extreme of this shoal.

Hindostan bank lies close northward of Round shoal, and is about $3\frac{1}{2}$ miles in length. The depths on the southern and middle parts are one to 3 fathoms, but about three-quarters of a mile from its northern extreme is a patch of hard sand with only 3 feet water. From this position Green point bears W. by N. $\frac{1}{4}$ N. distant $3\frac{1}{4}$ miles.

Merapie shoal, the northernmost of the dangers on the eastern side of Lucipara channel, is composed, like the others, of hard sand, and is three-quarters of a mile in extent north and south. The least water is $2\frac{1}{4}$ fathoms, and lies with First point bearing W. by N. $\frac{1}{2}$ N. distant 3 miles.

Buoy.—A buoy in about 5 fathoms marks the west extreme of this shoal.

Directions.—To steam vessels, Lucipara channel presents no difficulties, but it is not recommended for vessels of heavy draught, there being only about 4 fathoms on the leading mark at low water. Approaching Lucipara channel from the southward, and being northward of Arend bank, Lucipara island may be steered for,

* *See* chart of Banka strait, No. 2,597 also south entrance to Banka strait, No. 2,808.

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between the bearings of N. by E. and N.W., in depths of 5½ to 9 fathoms; with westerly winds a sailing vessel should keep on the western side of the channel in low water depths of 4¾ to 5½ fathoms.

In Lucipara channel the bottom is generally hard sand on the banks towards the eastern side, and soft mud on the western or Sumatra side: yet close to the north-western edge of Hindostan bank, the bottom is also soft, with 5½ and 6 fathoms; it is therefore advisable not to keep in too soft bottom, but in the middle of the channel.

In clear weather, when the Parmassang range is visible, the highest peak on the western extreme of the range in line with First point, N. by W. ¾ W., will lead into Lucipara channel, about half a mile clear of the 3-fathoms edge of the mudbank projecting from Lucipara point. From abreast the point the course is N. by W. (allowing for tide) with Mamelon hummock ahead, passing westward of the buoys marking Round and Merapie shoals. When False First point opens, a vessel may edge away to the westward to round First point, taking care not to approach it nearer than one mile, as the bank projecting from the point is steep-to, especially on its north-east side. After rounding First point, a N.W. by W. course will lead midway between False First point and Nemesis bank buoy, and when Lalari point bears N. by W. ¾ W. course may be altered to N.W. From Lalari point, *see* below.

Working through this channel a vessel may stand towards the Sumatra bank safely by attending carefully to the lead, but must not stand into less than 6½ fathoms when near the elbow projecting off Green point, which is steep-to. Lucipara island must not be approached nearer than 2 miles, when bearing northward of N.E.

Careful attention to the lead will also give sufficient warning when standing towards the banks on the eastern side. The tidal streams set across the banks with considerable strength. (*See* p. 394.)

Directions.—From Lalari point through Banka strait.* —Having passed through either Stanton or Lucipara channels, and brought Lalari point to bear about East, distant 3 miles, a N.W. by N. course, allowing for tide, for about 10 miles, will lead midway between the rocky bank of 7 to 8 fathoms water, lying north-westward of Timbaga rocks, and the mudbank projecting from Second point. Thence steer to pass about midway between Nangka lighthouse and Third point, observing that Second point bearing southward of S.S.E., leads eastward of the bank fronting Second bight.

* *See* chart, No. 2,597.

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When about 2 miles northward of Third point, haul to the westward, passing midway between Karang Brom Brom and Fourth point; and when Monopin hill bears North, distant about 12 miles, haul more to the north-westward, paying particular attention to the tidal streams, which frequently sets strong into or out of the rivers between Fourth and Batakarang points.

With Kalian lighthouse in line with Monopin hill bearing N.E. by N., distant about 5 miles, course may be shaped to pass eastward of Frederick Henry rocks. The lighthouses on Tanjong Kalian and Tanjong Ular afford ready means of fixing the position of the vessel from time to time.

If passing westward of Frederick Henry rocks, between them and Sumatra, vessels should keep in from 5 to 7 fathoms water on the edge of the bank off Batakarang point, and not more to the eastward than in 9 or 10 fathoms, while Monopin hill is between the bearings of East and E. by S.

Thence to the northward steer as requisite.

For outer route, *see* directions, p. 516; Rhio strait, p. 536; and inner route (Berhala), p. 563.

Working through Banka strait from the southward.—Directions have already been given for working through Stanton and Lucipara channels to Lalari point at pages 422 and 424. In working between Lalari point and Nangka islands the lead is a good guide, as the depths decrease regularly, except near Lalari point and Timbaga rocks, where they decrease rather suddenly from a depth of 10 fathoms; if, however, Lalari point be not brought southward of S.E. ¼ S. until Brani peak bears E.N.E., a vessel will keep clear of all danger near Timbaga rocks. Having arrived within 3 miles of Great Nangka, the spit extending from the south end of that island should not be approached under a depth of 7 fathoms; and to avoid the rocky ledges extending from Middle and West Nangka, West reef rock, 6 feet above water, should not be brought to the westward of North after the peak of Great Nangka bears N.E., until the vessel is northward of Nangka islands.

From Nangka islands to Tanjong Tadah the shore may be safely approached by the lead, as the depths gradually decrease. When Tanjong Tadah bears N.E. ¾ N. (which clears the eastern side of Karang Brom Brom), vessels should cross over towards Fourth point on the Sumatra coast.

See chart, No. 2,597.

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The bank fronting the Sumatra coast may be conveniently approached, when abreast the bights, by common attention to the lead; but off the points, and for a few miles on either side of them, great attention must be paid to the soundings, and the bank approached with caution, and never under a depth of 10 fathoms, as the water shoals suddenly from that depth. The most dangerous part of the bank is between Fourth point and 6 miles to the westward of it.

Westward of that part of the bank, the bank becomes shelving, and may be approached to 5 fathoms. Working westward of Frederick Henry rocks, the shore bank should be approached to those depths off Batakarang point; standing towards the rocks, a vessel should tack when the water deepens to 9 fathoms, which depth will keep a vessel about one mile westward of the rocks, there being from 12 to 16 fathoms close to them. Working through eastward of Frederick Henry rocks (should the buoy be adrift), it must be remembered that Monopin hill bearing E. ½ S. leads one-third of a mile southward of the rocks, and bearing E. by S. leads the same distance northward of them.

Sailing vessels working in either direction through the strait, or proceeding through with a fair wind and contrary tide, are recommended to keep on the Banka side, when between Lalari point and Tanjong Tadah. The advantages are as follows :—

A vessel may carry a fair stream all the way through by starting from either extremity at low water, as the tidal waves from the China and Java seas meet near Nangka islands; prominent hills and points, with a gradual decrease in the depths, give confidence to mariners when steering for the land; a strong land wind will be generally experienced during the night, when the regular monsoon is blowing in the middle of the strait and near the Sumatra coast; and in the strength of the monsoon regular tides will be met with on the Banka side, while strong currents will invariably be found setting to leeward along the Sumatra side.

Banka strait from the northward.—A vessel having passed the Tuju or Seven islands, and steering to the southward for Banka strait, will find no difficulty in clear weather in determining her position, which can be readily done by cross bearings of Gunong Penyabung (Saddle hill) and Monopin hill; under such circumstances the strait should be entered eastward of Frederick Henry

See charts, No. 2,597 and No. 2,149.

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rocks. But in thick weather it often happens that no land can be seen until the vessel has arrived very near to the entrance of the strait, and at such times it is important to get hold of the bank extending from the Sumatra coast, and then proceed along its edge in low water depths of 8 to 6 fathoms, carefully attending to the lead. Sometimes Monopin hill will be seen, but no other land, and in such case it will be prudent to proceed as before, keeping along the edge of the bank.

Working through Banka strait from the northward.—The passage westward of Frederick Henry rocks is much to be preferred when the land is obscured and reliable bearings cannot be obtained; at other times the eastern channel is preferable. By reversing the directions previously given for working through from the southward no difficulty will be experienced.

NORTH-WEST AND NORTH COASTS OF BANKA.*

BULU or Jibuse bay.—The north-west coast of Banka is about 43 miles in extent, from Tanjong Ular to Tanjong Melalu; Bulu or Jibuse bay lying between Tanjong Biat and Tanjong Ginting, occupying more than half of that space.

In the greater portion of this bay a depth of 3 fathoms, foul ground, will be found at 2 miles from the shore. Off Tanjong Ginting, a long and low point, the foul ground extends but half a mile, close to which there is a depth of 8 fathoms. The rivers Bulu and Kampa enter the bay at its eastern end. The bay is much visited by coasters, and occasionally by larger vessels for the purpose of loading tin.

Kamudy rock, awash at low water, lies within the 3-fathoms line, 2¼ miles W.S.W. of Sungi Kampa entrance, with Tanjong Ginting bearing N.W. ½ N. distant 5 miles.

Anchorage.—Bulu bay affords anchorage in 5 fathoms, soft muddy bottom, with Tanjong Ginting bearing N. by E. ½ E., distant 1½ miles, and Sungi Kampa E. by S. ½ S. Small vessels may go farther in according to draught.

Aspect.—North-eastward of Tanjong Ginting are three conspicuous hills, named Gunong Pare, 858 feet high, Gunong Penyabung, a remarkable saddle-shaped hill, 794 feet high, and Gunong Besukan, 657 feet high, which at a considerable distance appear like islands.

* *See* charts, No. 2,597, No. 2,757, and No. 2,149.

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The coast between Tanjong Ginting and Gunong Penyabung forms a small bay, encumbered with rocks. It thence trends north-eastward for 4 miles to pulo Pamuja, an islet close to the coast, thence in a direction a little more eastward for 5 miles to Tanjong Doyang, off which lies pulo Prout, and several rocks above water; thence eastward about 9 miles to Tanjong Melalu. The whole shore between Gunong Penyabung and Tanjong Melalu is fronted by a reef which extends in places one mile.

Off-lying rocks.—Malan Hyu, Malan Doyang, and Malan Guntur are three rocks lying off the coast between Tanjong Doyang and Tanjong Melalu. Malan Hyu, about 30 feet in length, and covered with guano, lies about 3 miles North from Tanjong Doyang. Malan Doyang is the size of Malan Hyu, and not much above water; it lies about 4 miles off shore, and the same distance eastward of Malan Hyu. Two rocks awash lie between Malan Doyang and the shore, distant 2 miles and $2\frac{3}{4}$ miles W. by S. $\frac{1}{4}$ S. from Seangus point; and a reef with 3 feet over it lies S. $\frac{3}{4}$ W. about one mile from Malan Doyang.

Malan Guntur, with two heads above water, lies nearly midway between Malan Doyang and Tanjong Melalu, nearly one mile north of Seangus point; a rock awash lies about half a mile W.N.W. of the northernmost rock.

Close northward of Malan Hyu and Doyang the depths are irregular, 12 to 24 fathoms; between them and the shore the depths are from 7 to 11 fathoms, rocky bottom. By keeping 4 miles off shore these dangers are avoided.

KLABAT BAY.—Tanjong Melalu or Melala is the western point of entrance of Klabat bay, and upon it is a hill of moderate height, known as mount Melalu. A reef extends about one mile north-eastward of the point.

Tanjong Penyusu, the eastern point of Klabat bay, is a long low projection, with an islet and some rocky patches extending nearly 2 miles westward from it.

Klabat bay extends about 27 miles in a south-east direction from Tanjong Melalu, and is 6 miles in width between the entrance points; it is encumbered with rocks and shoals, leaving only a narrow passage, of 4 or 5 fathoms water, by which small vessels proceed as far as the mouth of Menjangan river.

See charts, No. 2,597, No. 2,757, and No. 2,149.

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Gunong Maras (Crown peak).—At about 8 miles south-eastward of the head of Klabat bay is Gunong Maras or Crown peak, about 2,800 feet high, the highest of the Banka mountains. This mountain is easily recognised by its three peaks, which may often be seen when passing through Banka strait, presenting somewhat the appearance of a crown.

Karang Trasie Laut is a reef with one fathom water, and 7 to 10 fathoms around it, lying about 3 miles N.W. from Tanjong Penyusu.

Anchorage.—The usual anchorage is off the entrance, south-east of Trasie Laut, in 9½ or 10 fathoms, soft muddy bottom, having Penyusu islet in line with Gunong Maras, and Melalu point W. by S. ½ S. Tin is shipped from here.

The coast, from Tanjong Penyusu, trends eastward for 10½ miles to a point abreast pulo Mengkudu ; and thence 2½ miles beyond to Tanjong Grasak, the northernmost point of Banka.

Many rocks lie close to this part of the coast, and shallow water extends in places nearly one mile off. From Tanjong Grasak the coast trends south-eastward, forming the eastern coast of Banka.

Reefs.—A patch of 3¼ fathoms lies nearly 3 miles off shore with pulo Mengkudu bearing E. ¼ S. 4½ miles.

A shallow spit extends from Sungi Pasarin to within half a mile of this patch.

A reef having about 6 feet water lies 2 miles northward of Paku point, with Tanjong Grasak bearing W. ¾ N., distant 3½ miles. For the east and north-east coasts of Banka, *see* pages 434 and 456–460.

See charts, No. 2,597, No. 2,757, and No. 2,149.

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CHAPTER VIII.

GASPAR STRAIT AND ITS APPROACHES.

VARIATION in 1896.

Gaspar strait ... ... 2° 15′ E.

GASPAR STRAIT.—General remarks.—Gaspar strait, between the large islands of Banka and Belitung or Billiton, derives its name, as we are informed by Horsburgh, from the Spanish captain who passed through it in 1724, though Captain Hurle had previously done so when returning from China in the *Macclesfield* galley, in March 1702. Many islands divide the strait into three principal branches, having the names of Macclesfield, Clement, and Stolze channels. The first, through which the *Macclesfield* passed, is formed by Lepar and Leat islands. The second is named after Captain Clements, who commanded a fleet of English India ships in 1871, and who, on returning from China, chose the passage formed by Leat, Kwil, and Kalangbue islands to the westward, and Klemar and Ayer islands to the eastward. The third, Stolze channel, is bounded by Gresik island on the west side, and Mendanao, or Long island, on the east side, and is so named after the Dutch naval officer, J. Stolze, who was deputed to ascertain the positions of the islands on the west coast of Belitung.

Although the navigation of this strait is encumbered with many dangers, yet, as the course by it is more direct, and the distance less than by that of Banka, many seamen are induced to prefer it, especially when returning from China late in the north-east monsoon. The comparative advantages of both straits with reference to sailing vessels bound to Singapore and China have been shown in page 38; and it will only be necessary here to add a few remarks with reference to those returning from China.

Most homeward bound vessels, to whom saving of time is of the first importance, proceed through Gaspar strait; and there can be no

See chart of Gaspar strait, No. 2,137.

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doubt that they will continue to do so in preference to the more circuitous, although much safer, route of Banka strait. Until, however, the correct positions of all the shoals and dangers known to exist to the northward of Gaspar strait are determined, a vigilant look-out must be kept when approaching the strait from that direction, as dangers may exist that are not marked on the charts. Nor must vigilance be relaxed when getting near to pulo Leat, and when passing through the strait. No opportunity should be lost of determining the vessel's exact position; and the greatest attention should be paid to ascertaining the set of the current and to guard against its effects. Many fine sailing vessels have been lost in Gaspar strait; not a few on Alceste reef, from wrongly estimating their distance from the land; but in the majority of instances from causes which might have been guarded against by the exercise of due care and judgment.

Macclesfield channel was formerly the one generally taken, although Stolze channel is equally available. Both are partly lighted. Clement channel, between them, is much narrower than either of the other two, and its navigation somewhat more difficult.

SHOALS.—Southern approach.—Dangerous shoals extend for about 35 miles to the southward of Gaspar strait, rendering great caution necessary when approaching the strait from that direction.

Hippogriffe rocks, the south-westernmost of these dangers, lie on the eastern side of Macclesfield strait. The northern patch, situated in lat. 3° 34¼′ S., long. 106° 55½′ E., is a coral rock, with 3 feet water, and about 50 yards in diameter. Other rocks lie between the bearings of south-west and south-east, distant three-quarters of a mile from the northern rock.

Hancock shoal is a small patch about a quarter of a mile in extent, having one fathom of water, and 6 to 7 fathoms around. It lies 9 miles E. ¼ N. of Hippogriffe rocks.

Turtle shoal, with a depth of 3 feet, and 7 fathoms close-to, lies about 2 miles N.E. by E. ½ E. from Hancock shoal, and is of about the same extent. It is usually marked by tide ripples.

Larabe shoal, distant 6 miles E. by N. ½ N. from Hancock shoal, is about one-third of a mile in extent, having 3¼ fathoms water, and 5 to 8 fathoms around.

See chart of Gaspar strait, No. 2,137.

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Sand island is the name given to a small patch of sand, awash at high water, with 8 fathoms around, lying about $3\frac{1}{2}$ miles N. $\frac{1}{2}$ W. from Larabe shoal.

At one-third of a mile E. by N. from Sand island, is a shallow patch about one-third of a mile in extent, having $2\frac{1}{2}$ fathoms water, and 8 to 9 fathoms around; it is marked by tide rips.

Padang reef lies about $1\frac{3}{4}$ miles W. by N. $\frac{1}{2}$ N. from Sand island; also, a reef named Haaijen is situated W. $\frac{3}{4}$ S., distant $3\frac{1}{4}$ miles from that island. Between Padang reef and Sand island there is a patch of 3 fathoms.

Middle reef, lying N.N.E. $\frac{3}{4}$ E. nearly $2\frac{1}{4}$ miles from Sand island, is a small sand patch having a rock which dries on its northern end, and 8 to 9 fathoms around.

Branding breakers, lying north-west, nearly $1\frac{3}{4}$ miles from Middle reef, are two small patches occupying a space about 6 cables in extent, and with 12 fathoms water between them. The western patch has $1\frac{1}{4}$ fathoms water, and the eastern one 3 feet.

Fairlie rock lies $10\frac{1}{2}$ miles westward from Sand island, with Shoalwater lighthouse bearing N.E. by E. distant 15 miles, and the island just in sight from the deck. It is a coral rock about one cable in diameter, nearly awash at low water, with from 6 to 7 fathoms close around. The sea breaks over the rock, and all around are overfalls caused by the rocky and uneven character of the bottom, particularly to the north-eastward. Shoalwater island lighthouse bearing E.N.E. leads midway between it and Blas Mateu rock.

Blas Mateu rock, of $1\frac{1}{2}$ fathoms, lies in the fairway track of vessels proceeding through Gaspar strait by Macclesfield channel. It lies with Shoalwater island bearing E. by N., distant $17\frac{1}{2}$ miles.

SHOALWATER (Se Miedang) ISLAND, in lat. 3° 19′ S.,* long. 107° 13′ E., and 10 miles N. by E. $\frac{1}{4}$ E. from Sand island, is a little more than half a mile in diameter, and surrounded by a reef which extends from 5 to 7 cables. Detached reefs lie off the eastern side at a distance of one mile.

Hancock island is small, and lies three-quarters of a mile north-north-eastward of Shoalwater island. Off its north-east side a reef extends about one-third of a mile, and off its north-west side about

*See chart, No. 2,137.

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three-quarters of a mile, with some rocks above water on its outer edge. A patch of 3 fathoms lies 4 cables off the west edge of the reef.

LIGHT.—From a white lighthouse, 200 feet high, erected on the west side of Shoalwater island, is exhibited at an elevation of 215 feet above high water, a *fixed white* light, visible in clear weather from a distance of 20 miles.

One-Fathom patch, with 7 to 9 fathoms around, lies W. ¼ N. nearly 2 miles from Shoalwater island. A patch of 3 fathoms lies about three-quarters of a mile westward of the lighthouse.

Embleton rocks, awash, lie on a sandbank which nearly dries, 2 miles N.W. by N. from Shoalwater island; there are depths of 11 to 14 fathoms around the bank.

Bliss shoals lie one mile north-eastward of Embleton rocks, and are about one-third of a mile in extent; the least depth is 2 feet, with 6 to 12 fathoms at a short distance. A patch of 3 fathoms lies midway between Bliss shoals and Hancock island.

VANSITTART SHOALS are a number of rocky patches extending 10 miles south-westward of Bakau island, east side of Macclesfield channel. The two southern patches of this group lie nearly east and west from each other, and about 3 miles apart. From the western patch of 4 feet, Kwil island bears N.N.E. ¼ E. distant 11½ miles; from the eastern patch of 1½ feet, Kwil island bears N. ⅞ E. distant 11 miles.

A patch of 3¾ fathoms lies with Bakau island bearing N. ¼ E., distant 7½ miles.

Near the centre of the Vansittart group are four patches about one mile in extent, one of which nearly dries.

The northern patches of the group are 2 miles apart in an E.N.E. and W.S.W. direction. From the south-west patch of 4 feet, Kwil island bears N.N.E. distant 6½ miles. From the north-east patch of 1¼ fathoms, Bakau island bears N.E. distant 2½ miles.

For the marks to clear Vansittart shoals, *see* directions, page 440.

GEORGE BANKS is the name given to the banks lying southward and south-westward of Murong point, pulo Lepar.

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Two-and-a-Half Fathoms bank, formerly known as George bank, is 2½ miles in length, and one mile in breadth, within a depth of 5 fathoms. The least depth, 2½ fathoms, lies with Murong point bearing N. ¼ W., distant 6⅓ miles.

Rocky point hill open eastward of Murong point, leads eastward of the bank.

About 2½ miles W. ½ N. of the 2½-fathoms bank is a small patch of 5 fathoms.

Falcon bank, with a least depth of 1½ fathoms, lies with Pergam or Round island bearing N. ½ W., and distant from its outer edge 2⅓ miles. From this position the bank extends one mile eastward, and 6 miles south-westward, fronting Lepar strait. On the southern extreme is a patch of 3 fathoms, with Baginda hills bearing N.W. by W. distant 5⅓ miles.

Sandbanks.—At 12¾ miles south of Murong point is a patch of 5 fathoms; and at 2½ miles W. ½ S. of this is another of the same depth.

A doubtful bank, with 4½ fathoms water, is reported to lie South from a remarkable hummock in Banka, in lat. about 3° 18½′ S., unsuccessfully searched for by H.M.S. *Saracen*. Other banks may exist in this neighbourhood, which has not been properly surveyed.

The dangers off the south coast of Banka have been described with Banka strait.

MACCLESFIELD CHANNEL.

Macclesfield channel is the best route through Gaspar strait; it is provided with two lights but the dangers are not buoyed; there are sufficient objects for cross bearings, however, by which they may be easily avoided. Its approach from the southward is bounded on the eastern side by Hippogriffe and Fairlie rocks, and Vansittart shoals; and on the western side by George banks. Blas Mateu rock lies right in the fairway.

EAST COAST of BANKA.—From Baginda point (p. 402), the south-western limit of Gaspar strait, the coast of Banka trends northward 4¾ miles to Roe point, forming the west side of Lepar strait; thence it recedes and forms a bay, the northern limit of which

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See chart, No. 2,137.

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is Berikat point. There are several small rivers upon this part of the coast, the principal of which is the Kumba, and is sometimes visited by coasters.

Berikat point is the north-east extreme of Banka island, and the north-west limit of Gaspar strait. Berikat hill, 660 feet high, stands on its south part. A rock, 28 feet high, lies close off the north-east extreme of the point.

Berikat bank fronts the eastern shore of Banka island from Lepar strait to Berikat point, from which point it extends 4 miles S.S.E., having 1½ fathoms upon its outer edge, decreasing suddenly from 10 fathoms in places.

Wilson bank, on the eastern edge of Berikat bank, has a least depth of 7 feet, and 6 fathoms close-to, with Berikat point bearing N.N.W. ¼ W. distant 6⅓ miles.

Lepar strait, between Banka and pulo Lepar, is 7 miles wide at the south-east entrance, but narrows to 1⅓ miles abreast Roe point. This entrance is barred by a flat which extends right across with a depth over its centre of about 2 fathoms, between banks which dry at low water; the northern entrance has about the same depth. The strait, therefore, is only available for small craft, with local knowledge.

Tingue island, with a sugar-loaf shaped peak, 915 feet high, lies within the north entrance of the strait.

Pulo Lepar is an irregularly shaped island, about 12 miles in length, and 10 miles in breadth, separated from the east coast of Banka by Lepar strait. On its southern part are several ranges of hills of moderate elevation; viz.:—Six-peak range, 781 feet high; Mujuk or Maroon hill, 850 feet; Four-peak range, 750 feet; and two hills not named on the chart, 650 feet high; near its western end is False Sugar-loaf, a hill 700 feet high.

Murong point is the south-eastern extreme of pulo Lepar. The land over it is hilly, and the point is bordered by a reef, extending from one to 2 cables.

Pergam or Round island is an islet surrounded by reefs lying about 2 cables off Pergam point, on the south coast of the island.

See chart, No. 2,137.

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Water.—Northward of Murong point the coast forms a bay, in which are two streams where water may be obtained ; though slightly tinged with a red colour it produces no ill effects. Vessels may anchor about one mile north-eastward of the point, abreast of which position is a sandy beach.

Labu or Rocky point is the north-east extreme of pulo Lepar ; Rocky point hill, 522 feet high, stands $1\frac{3}{4}$ miles within it.

The coast between Murong and Rocky points is fronted by a bank, which midway extends off to the distance of $1\frac{1}{2}$ miles ; its outer edge is about three-quarters of a mile north-eastward of Rocky point, increasing its distance off shore towards the north point of the island to $1\frac{1}{2}$ miles.

LIGHT.—On Labu point, from a white iron framework 45 feet in height, a *fixed white* light is exhibited at an elevation of 49 feet above high water, visible in clear weather between the bearings of N. 5° E., through north, and S. 14° E., from a distance of 10 miles.

Kilapan and Senior are two hilly islands lying 3 miles northward of pulo Lepar. Kilapan is about $1\frac{3}{4}$ miles in extent east and west, and three-quarters of a mile wide ; Senior, lying $1\frac{3}{4}$ miles to the westward, is somewhat smaller.

Klippige shoals, four in number, having rocks above water, lie off Labu point. The outer rock lies N.E. by E. $\frac{3}{4}$ E., distant 2 miles from the point ; the southern shoal with a depth of $4\frac{3}{4}$ fathoms, lies $2\frac{1}{4}$ miles S.E. by E. $\frac{3}{4}$ E. from the same point.

Close to these shoals are depths of 9 to 14 fathoms.

Batu Denem, an isolated rock dry at low water, lies about three-quarters of a mile north-eastward of Labu village ; a patch of 4 fathoms is charted $1\frac{3}{4}$ miles N. by E. $\frac{1}{2}$ E. of the village.

Discovery rock lies near the centre of Macclesfield channel, and N.N.E. $\frac{1}{2}$ E., distant $4\frac{1}{4}$ miles from Labu point, with a shallow bank extending nearly half a mile north-eastward. It is about 30 yards in diameter with a depth of 2 feet at low water, and steep-to ; it seldom breaks. Close to the rock and bank are depths of 7 to 10 fathoms.

A rocky patch, with a depth of 3 feet, lies 2 miles W. by S. from Discovery rock.

See chart, No. 2,137.

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PULO LEAT, which separates Macclesfield and Clement channels, is about $5\frac{3}{4}$ miles in length, north and south, and $4\frac{3}{4}$ miles in breadth. Upon it are several hills, 400 to 600 feet high; Putat hill, on the south side, is 613 feet high.

Fresh water may be obtained in the bay, half a mile northward of Whitewashed point, the south-east extreme of the island.

Pulo Chilagin or **Jelaka** is an islet lying about 2 cables north-westward of the west point of pulo Leat, with which it is connected by a reef.

LIGHT.—On pulo Chilagin, from an iron frame, on or near a white dwelling house, is exhibited at an elevation of 52 feet above high water, a *fixed white* light, visible between the bearings of N. 28° W. (through north and east) and S. 28° W. from a distance of 11 miles in clear weather.

Reefs.—The south and south-west coasts of pulo Leat are fronted by a reef with detached patches, which, off Middle point, project one mile from the shore. Off Whitewashed point, the south-east point of the island, are outlying rocks and dangers extending in a S. by W. direction for $2\frac{1}{2}$ miles.

Alceste reef.—The north-west shore of pulo Leat, to a distance of $1\frac{1}{2}$ miles, is fronted by numerous outlying rocks and patches of reef, between which and the reef extending from the shore are some dry sandbanks. Alceste reef, with a patch of $2\frac{3}{4}$ fathoms outlying it, are the northernmost of these patches, and lie $1\frac{1}{2}$ miles north-west of the north point of pulo Leat; Alceste reef has a least depth of 2 fathoms.

Many vessels have been lost on this reef, or on some of the coral patches contiguous to it, all of which are steep-to.

The eastern coast of pulo Leat is fronted by a coral reef to the distance of half a mile in places (for off-lying dangers *see* p. 443). Close northward of the eastern extreme, and upon the shore reef, is an islet named pulo Anak, or Selagin.

Off the north-east coast of pulo Leat, besides the reef projecting from the shore, are numerous coral patches extending 2 miles from the island.

See chart, No. 2,137.

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Sandringham reef, with 7 feet water, is the northern of these patches, and lies with the north end of pulo Leat bearing S.W., distant 2 miles; a small reef, awash at low water, lies one-third of a mile eastward of it.

Clearing marks.—A vessel will pass eastward of these danger by keeping Whitewashed point bearing westward of S. by W. ½ W or Klemar island bearing S.E. ¾ S.

Akbar shoal, lying 15 miles north-eastward of pulo Leat, lies in lat. 2° 39′ S., long. 107° 15¼′ E., with a depth of 9 feet. It is more directly in the approach to Clement strait than the Macclesfield, when coming from the northward.

BOOMPJES ISLAND, distant 9½ miles north-eastward from Berikat point, is a rock 40 feet high, with a few trees on the summit, rendering it visible about 15 miles. It is surrounded by a coral reef which, off the south side, extends half a mile with a rock above water on it. There is a cave upon this island where the Malays collect edible birds' nests, which are probably found also on the other islands.

A detached coral reef lies half a mile E. by N. of the island.

GASPAR ISLAND lies North, distant 24 miles from the north point of pulo Leat. Its centre rises to a peak 812 feet high, which may be seen in clear weather at a distance of 30 miles, and is the principal mark for avoiding the shoals in sailing to or from the northern part of the strait. It is surrounded by a reef, which projects from the south and east points of the island about a third of a mile.

Position of the east peak, lat. 2° 24¾′ S., long. 107° 5′ E.

Water.—Fresh water is to be found upon this island.

Glassa rock, 24 feet high, with some trees, lies about one mile westward of Gaspar island. It is surrounded by a reef extending about one-third of a mile south-eastward from it, but not quite so far in other directions.

Gaspar island, Glassa rock, and Boompjes island form the northern limit of Gaspar strait. Canning rock, Warren Hastings reef, and other dangers are described in pages 460–461.

See chart, No. 2,137.

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Tides and Currents.—It is high water, full and change, in Macclesfield channel at about 2h. 30m., and the ordinary rise is about 4 feet. The tides are irregular, and there is but one rise and fall during the 24 hours. At the southern entrance the flood runs north-westward and the ebb south-eastward, or across the strait.*

The currents greatly depend upon the strength of the monsoon When the monsoon is strong, the current will generally be found setting in the same direction at the rate of 2 or 3 knots an hour, but affected somewhat by the tidal streams.

DIRECTIONS.—Macclesfield channel from the southward.—Macclesfield channel presents no difficulties to a steam vessel or a sailing vessel with a fair wind. Proceeding towards Macclesfield channel, and having followed the directions, p. 390, for passing the Two Brothers and North Watcher, may steer to pass eastward of the Five-fathoms banks for Baginda point. In thick weather, or if uncertain of the vessel's position, the entrance of Gaspar strait should be approached with caution, keeping a good look-out for broken or shallow water.

Caution must be exercised when in the vicinity of Hippogriffe and Blas Mateu rocks, observing that the Six-peak range on pulo Lepar, kept N. ½ W., will lead 4 miles westward of Blas Mateu rock; and when Baginda hill bears N.W. ½ N., and the water has deepened from about 8 fathoms to 12 or 15 fathoms, steer to the north-eastward until Rocky point hill is well open eastward of Murong point, which will lead eastward of George banks. Or, it might be convenient for a sailing vessel to make Murong point on a N. by E. or N.N.E. bearing, passing westward of the 2½-fathoms bank.

From abreast Murong point, pulo Chilagin or Jelaka light may be steered for, bearing N.N.E. or northward of that bearing, which leads eastward of the dangers off pulo Lepar. When about 3 miles from the light, steer to pass about midway between it and Discovery rocks, whence course may be gradually altered for Gaspar island. *Continued at* p. 463.

Working through from the southward.—During the strength of the north-west monsoon it is almost impossible to work

See chart, No. 2,137.

* It is probable that the direction of the tidal streams in Gaspar strait, and also the times of high water and the rise, are similar to those in Carimata strait, and flow into the strait both from northward and southward (*see* page 467), but information is wanting on this point. The time of high water, given above, was obtained by the U.S. surveying vessels in 1854, and apply to the months of January—April.

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through Gaspar strait; even in the latter part of the monsoon, about March, when the winds are light, sailing vessels often are obliged to anchor on account of the strength of the southerly current. In the south-east monsoon also, vessels will often meet with light variable winds, rendering it impossible for them to preserve a direct course.

The approach to Macclesfield channel does not afford convenient objects as marks to keep vessels clear of danger, but the following have been taken from the chart as being, so far as can be judged, the best for that purpose.

As, however, some of the objects are at a considerable distance from the dangers, navigators are cautioned not to depend too implicitly upon having made out, or being able to make out, such distant objects, but rather to rely upon a more general exercise of judgment, paying attention to the soundings, frequently referring to the chart, &c. It is indispensable that the greatest vigilance be observed, and careful regard had to the set of the tidal streams and currents, in order to work a vessel safely through this channel.

Standing to the eastward.—A vessel being northward of Hippogriffe rocks may stand to the eastward towards Sand island (which is just awash at high water) until it is but 4 miles distant, or within half a mile of Haaijen reef; Blas Mateu and Fairlie rock, south-eastward of it, must be given a wide berth. Shoalwater island, bearing N.N.E. ½ E., leads one mile westward of Branding breakers. This island should not be approached nearer than 3 miles, on account of the dangers lying westward of it.

To clear Vansittart shoals.—Murong point kept northward of N.W. leads southward of the shoals; and Kalangbue island summit bearing N.E. ½ E. leads north-westward of the southern portion of the shoals. Putat peak, on pulo Leat, kept eastward of North, leads westward of the north-west portion of Vansittart shoals; and Ayer island open northward of Bakau island leads northward of them.

Being northward of Vansittart shoals, Bakau island must not be brought southward of E. by S. ½ S., or Slemar island westward of North, to avoid the shoals between those islands; and to clear the patches lying southward of pulo Leat, keep Kwil island eastward of E.S.E., or Putat hill northward of N. by W.

To clear the reefs southward of pulo Chilagin (Jelaka), the south-east point of pulo Leat should not be shut in by Middle point until

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See chart, No. 2,137.

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pulo Chilagin bears N.N.E. (light in sight at night); and to avoid the reefs westward of that islet, keep Middle point eastward of E.S.E. until pulo Chilagin bears East. Pulo Chilagin bearing East also leads northward of Discovery rocks.

To avoid the reefs extending off the north-west side of pulo Leat, keep Rocky point southward of S.W. by S. until pulo Kilapan bears S.W. by W. ½ W.

The lights on pulo Chilagin or Jelaka and Labu point afford ready means of fixing the position of a vessel at night.

Standing to the westward.—To clear the 2½-fathoms bank southward of pulo Lepar, keep Rocky point hill open eastward of Murong point, bearing N. by W. ½ W., until Baginda hill bears W. ½ N., when a vessel may stand over until Murong point bears N. by E. ½ E.

To clear Klippige shoals, do not bring Murong point southward of S.W. by S. until the north extreme of Kilapan island bears N.W. ½ W.

When standing towards Discovery rocks, do not bring Rocky point light southward of S.W. by S. until pulo Chilagin bears East, when a vessel will be northward of the dangers, and may stand westward toward the bank into 8 fathoms until near Wilson bank.

The Saddles, two hills on the Banka coast, 912 feet high, bearing W.N.W., or mount Pading W. ¾ N., lead about 1½ miles southward of Wilson bank; and the extreme of Berikat point, N.W. by N., leads one mile eastward of that danger. *Continued at* p. 463.

Macclesfield channel from the northward.—In the early part of the north-east monsoon, northerly and north-westerly winds prevail about the entrance of Gaspar strait, when strong south-easterly currents will generally be experienced between Gaspar island and pulo Leat.

It appears certain that the frequent accidents which formerly happened to vessels in the vicinity of Alceste reef arose principally from neglecting to guard against the effects of this current. A vessel, therefore, intending to proceed to the southward through Macclesfield channel, and having passed from one to 2 miles eastward of Gaspar island, should steer to the south-westward until Gaspar island bears N. by E., upon which bearing it should be kept until pulo Kilapan

See chart, No. 2,137.

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is S.W. by W., the north point of pulo Leat S.E. by E., and pulo Chilagin in sight. Here she will be in the fairway of the channel, and may steer South, carefully guarding against the effects of tidal streams or currents by frequent cross-bearings, passing midway between Discovery rock and pulo Chilagin.

The directions from southward, reversed, will apply to the remainder of the channel.

Working through from the northward it will generally be advisable to get over towards the Banka coast as soon as possible, where a vessel will be more in the fairway of the channel, and will find more convenient depths of water for anchoring if it should be necessary.

CLEMENT CHANNEL.

This channel is narrower and more encumbered with dangers than either Macclesfield or Stolze channels, between which it lies, but is easily navigable by steam vessels or sailing vessels with a fair wind.

Islets and dangers.—Bakau and Kalangbue are two small islands nearly one mile apart, and about half a mile in diameter, lying in a south-east direction about 8 miles from pulo Leat. Bakau island, the westernmost, is 123 feet high ; Kalangbue island has two hills forming a saddle, the western hill being 210 feet, and the eastern 266 feet high. Both islands are surrounded by reefs.

A reef nearly one mile in extent lies one mile north-eastward of Kalangbue island.

Slemar island, 3½ miles north-westward of Bakau island, is small, low, and surrounded by rocks to the distance of one-third of a mile.

Kwil island, about 1½ miles eastward from Slemar island, is about a third of a mile in diameter, 154 feet high, and surrounded by a reef to the distance of one-third of a mile.

Reefs, dry at low water, extend 1½ miles between the bearings of S. by E., and S. by W. from Kwil island.

See chart, No. 2,137.

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Ayer island, on the east side of Clement channel, lies 10 miles from the south-east point of pulo Leat. It is about one mile in diameter, 200 feet in height, and surrounded by a reef extending about half a mile; three-quarters of a mile off its south extreme is an isolated reef, steep-to.

Gresik island, lying 2 miles eastward from Ayer island, and bordering Stolze channel, is described on page 449.

Klemar island, 240 feet high, lying 1¼ miles northward of Ayer island, is surrounded by a reef, to the distance of 3 cables. At three-quarters of a mile E.N.E. from the island is a reef dry at low water, with 15 fathoms around it. Half a mile south-east from the centre of the island is a patch of less than 3 fathoms.

A sunken rock, having a depth of 9 feet, lies W. by S. distant 2 miles from Klemar island, in the middle of the fairway of Clement channel.

Middle Pass shoals are three coral patches lying close together and extending nearly one mile in a north-east and south-west direction. From their south extreme, which dries, Whitewashed point bears N.W. by W. ½ W. distant 2¾ miles. Kwil island bearing S. by W., leads two-thirds of a mile eastward of the shoals.

A coral bank awash, with 12 fathoms around, lies 1¾ miles N.W. by N. of Middle Pass shoals, and the same distance from pulo Leat. Whitewashed point bearing W. by S. leads southward of the bank; and pulo Anak, N.W. by N. leads north-eastward.

Hewitt shoal, about 70 yards in extent, with a depth of 2½ fathoms and 9 to 12 fathoms close-to, lies with the eastern hill of Klemar island bearing S. by E. ¾ E. distant 5 miles.

The summit of Ayer island open eastward or westward of Klemar island leads clear of Hewitt shoal.

Akbar shoal is described on page 438.

Directions.—Proceeding through Clement channel from the southward, having passed midway between Fairlie and Blas Mateu rocks, from which position Shoalwater island lighthouse should be seen bearing E.N.E., steer to pass 6 or 7 miles north-westward of it. When the summit of Ayer island is made out, bring it to bear N. by E. ½ E.; or Shoalwater island brought to bear South and kept astern, will lead in the fairway to Ayer island.

See chart, No. 2.137.

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Approaching Ayer island on a N. by E. ½ E. bearing, the depths will be 9 to 14 fathoms until well up with Bakau island, when they will deepen to 20 fathoms, and to 25 or 30 fathoms when abreast of Kalangbue island. When Kalangbue island bears West, steer N. by W., passing about one mile westward of Ayer and Klemar islands, eastward of the reef off the north-eastern side of Kalangbue island, and midway between Klemar island and Sunken rock. When the north extreme of Klemar island bears East, steer N.W. by N. to pass between Middle Pass shoals and Hewitt shoal, and when Whitewashed point bears W.S.W., a course N. by W. may be shaped for Gaspar island.

Kalangbue island bearing S. ½ E. leads midway between Kwil island and Sunken rock, and between Middle Pass shoals and Hewitt shoal; thence course may be shaped to pass eastward or westward of Akbar shoal. Coming from the northward the directions should be reversed.

Working through.—No vessel would from choice attempt to work through Clement channel, as Macclesfield and Stolze channels are much better adapted for that purpose; but it is possible that a vessel, embarrassed by light baffling winds, may find it convenient to proceed through some part of it. The numerous islands afford every facility for fixing the position of the vessel from time to time.

MIDDLE PASS, which unites Macclesfield and Clement channels, is formed by Slemar island, Kwil island, Sunken rock, and Klemar island on the south-east; and by the dangers projecting from the southern extreme of pulo Leat and Middle Pass shoals on the north-west.

Directions.—To proceed from Macclesfield channel through Middle Pass from the south-westward, steer between Murong point and Vansittart shoals towards Slemar island, the channel between which and the shoals extending from the southern end of pulo Leat is clear, with depths of 14 to 20 fathoms; Murong point kept bearing W. by S. ¾ S. will lead through in mid-channel, and at about one mile northward of Slemar island.

In working through, the following clearing marks may prove useful:—The east extreme of pulo Leat bearing North clears the

See chart, No. 2,137.

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dangers extending from the west side of Slemar island, and southward of pulo Leat; Kwil island E.S.E. leads southward of the latter; Middle point W.N.W. leads south of the Middle Pass shoals; and the north extreme of Kwil island W.S.W. leads northward of Sunken rock.

STOLZE CHANNEL.

General remarks.—Stolze channel presents no difficulties to a steam vessel or a sailing vessel with a fair wind. It has one light, but no buoys or beacons excepting those on Teree and Njela reefs northwestward of pulo Selio, but there are many islets by which the position of a vessel may be checked when necessary for the avoidance of dangers. The southern entrance is bounded on the west by Shoalwater island and the reefs southward of it described in page 432, and on the east by pulo Selio, Carnbee rocks, and other shoals. These latter shoals are much against this channel in making it from the southward, for Carnbee rocks—the most southern of the dangers—lie 20 miles distant from the land, so that in thick or hazy weather, when a vessel might be uncertain of her position, she would not be able to make Belitung island with nearly the same safety that she would be able to make pulo Lepar or the south coast of Banka. These shoals would appear to form the only drawback to the adoption of this channel, and in fine weather even this would almost disappear, for the hills on Belitung are high, and may be seen at a distance of 30 or 35 miles, and Shoalwater light, on the western side, is visible about 20 miles.

DANGERS in southern approach.—East side.—Carnbee rocks, in lat. 3° 34½′ S., long. 107° 41′ E., are of coral formation, about 2 cables in extent, with a portion dry 5 feet at low water, and depths of 12 to 15 fathoms at one cable distant.

These rocks are difficult to distinguish at high water, when the sea is smooth, from a distance of more than one cable.

A rocky patch with less than 3 fathoms, lies one mile N. by E. ½ E. from Carnbee rocks.

Anvang bank, at about midway between Carnbee rocks and pulo Selio, consists of large black rocks, some of which dry at low

See chart, No. 2,137.

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water, with depths of 5 to 13 fathoms close-to. From the western extreme of the bank, Gunong Bolo, on the south point of pulo Selio, bears N.W. by N. distant 10½ miles.

Naga reef, a shallow patch, lies S. ¾ E., distant 2½ miles from Anvang bank.

Cooper shoals, lying 2½ miles northward from Anvang bank, have a depth of 2 feet, and from 7 to 10 fathoms close-to, with Gunong Bolo bearing N.W. by N. distant 8 miles.

Three-feet shoal, lying 4½ miles north-westward from Cooper shoals, with Gunong Bolo bearing N. ½ W. distant 4¼ miles, is a patch having 3 feet water, and 10 to 13 fathoms around.

Patches with depths of 3 to 5 fathoms lie between Cooper and Three-feet shoals.

Masar islands consist of two small islands. Kennedy, the westernmost island, lies 6½ miles N.E. by E. of Anvang bank, with a small islet three-quarters of a mile north-west of it. Otan is rather smaller than Kennedy island, and lies about 1¾ miles E.S.E. from it.

Other islands and dangers lie to the southward of Belitung (*see* page 469), but they are to the eastward of the track of vessels bound through Gaspar strait.

THE WEST COAST OF BELITUNG (Billiton), forming the eastern limit of Gaspar strait, is fronted by numerous islands, separated by narrow and, for the most part, unnavigable passages. Pulo Selio, with the dangers westward of it, the Lima island group, and pulo Mendanao, the largest of the islands, form the eastern limit of Stolze channel.

Aspect.—At the south-west extreme of Belitung, or Billiton, are the Gunong Baginda (Haycocks), two remarkable hills, 496 feet high, within Tanjong Kiras. At 5 miles north-eastward of the Haycocks is Beluru hill, 1,166 feet high, and to the eastward of Beluru are Luda, Pyramid and South peak, all of which serve to determine a vessel's position when approaching the strait from the southward.

At 7 miles northward of Beluru are Dudat or Kilang, 1,198 feet, and Kubing, 1,090 feet high; at 10 or 11 miles northward of Beluru

See chart, No. 2,137.

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is Agong, 1,242 feet high, and 7 miles northward of Agong is Liang, 1,096 feet high. The whole of the hills just mentioned are visible from the southward and south-westward. At 3 miles south-eastward from Tanjong Bienga, a high bluff forming the north-western extremity of Belitung, is Gunong Tobalo, the summit of which is 540 feet high.

Islets and dangers.—Pulo Selio is 3½ miles in length, with Gunong Bolo, a conspicuous hill, 242 feet high, upon its south extreme; it is surrounded by a reef, which, on the south-east side, extends 3½ miles, with pulo Saribu standing about midway on it. Pulo Saribu is separated from the south-western point of Belitung by a channel nearly 2 miles in width, but its south entrance is apparently blocked by a reef, 4 miles in length, lying southward of pulo Saribu.

White rock, 28 feet high, stands on the western edge of a rocky patch, lying 3 miles westward of the south point of pulo Selio; rocks which dry at low water extend one mile south-eastward from White rock, and between this shoal and pulo Selio is a channel about one mile wide, having depths of 5 to 7 fathoms.

Tiga reef, about one-third of a mile in extent, having 1½ feet water, and 10 to 16 fathoms close-to, lies N.W. ¾ W., distant 1¾ miles from White rock.

Njela bank, of sand, about one mile in diameter, dries at low water at 3 miles N. by W. of White rock.

Anchorage.—Westward of pulo Selio vessels may anchor to fill up water. Gunong Bolo, bearing between E. by S. ¾ S. and S.E. by E., leads between Tiga shoal and Njela bank. The anchorage nearest to the watering place is in 6 or 7 fathoms, bottom of sand and shells, with White rock bearing S.W. ½ S., and the south extreme of pulo Selio S.E.

Water.—Fresh water is to be found in the northern part of the bay on the west side of pulo Selio. Also a little to the northward of Tambelan point on the south-west coast of Belitung there is a rivulet of good water, easily approached by boats.

Inshore passage.—Beacons.—At 3 miles northward of Njela bank, is Teree or Tela shoal, which lies off the south end of

See chart, No. 2,137.

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the bank extending 7 miles southward from pulo Mendulok and forming the east side of the channel leading eastward of Lima islands and pulo Mendanao. A white nun buoy in about 5½ fathoms lies on the west side of Teree shoal. A shallow patch lies midway between this buoy and Ross island of the Lima group.

A white beacon with cone, marks the west edge of the shallow bank, at about one mile north-west of pulo Mendulok; two black stake beacons with balls, mark the eastern edge of the bank abreast it, extending southward of pulo Gala. These beacons are about one mile apart, and distant 1½ miles from the white beacon.

Sikindang, Sebongkok, and Hoorn are small islands lying in the channel between the east coast of Mendanao and Belitung. Hoorn island is connected with Mendanao by a reef.

The dangers in the north end of this channel are mentioned at pages 450, 451.

The inshore channel, marked by these beacons and buoys, has plenty of water and appears to present no difficulty if the buoyage can be depended on.

In working to the southward during the south-east monsoon, this channel appears to offer a quick passage, as the water is smooth, and the wind is said to blow directly off shore, which would be a leading wind.

Lima islands are a number of small islands surrounded by reefs, between which are narrow passages having depths of 10 to 20 fathoms water. Ross, or Bamijo, the southernmost of these islands, is 42 feet high; the others are, Benolo, 94 feet; Kasenga, 58 feet; Bago, 146 feet; Betong, 170 feet; and Ringet, 158 feet. Ross island is encircled by a reef to the distance of half a mile in places; Tuan patch, dry at low water, lies three-quarters of a mile S.E. by E. ¼ E. from it. A reef with 5 feet water lies N. ¾ E., distant 1¾ miles from Kasenga island. Eastward of a line joining this reef and Ayer Lanchu lighthouse are many isolated reefs, the neighbourhood of which is better avoided.

Clearing mark.—Ayer Lanchu lighthouse bearing N. ¼ E. leads westward of the Lima islands, and the shoals northward of them.

See **chart, No. 2,137.**

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Gresik island, forms the western limit of the narrowest part of Stolze channel, the reef extending from Kasenga forming the eastern limit. From its isolated position this island serves as an excellent mark to guide vessels in steering for the narrow part of Stolze channel when approaching it from either direction. It is surrounded by a reef to the distance of 3 cables, and a detached shoal, with 14 feet water, lies half a mile south-eastward of it.

A patch of 2½ fathoms lies nearly in mid-channel between Gresik island and Ayer island.

Ayer and Klemar islands are described on page 443.

Pulo Mendanao or Long island, lying 8 miles north-eastward of Gresik island, is much the largest of the numerous islands which front the west coast of Belitung. It is about 8 miles in length, the same in breadth, and is for the most part low, but some of its hills attain a height of 600 to 700 feet; Ayer Lanchu, its western extreme, projects considerably from the main body of the island.

LIGHT.—From an iron lighthouse 118 feet high, painted white, situated on Ayer Lanchu or Lantju, is exhibited at an elevation of 204 feet above high water, a *fixed white* light, visible in clear weather from a distance of 21 miles.

Pulo Ayam is an islet lying 2½ miles south-eastward of Ayer Lanchu, at about one mile off shore.

Pulo Gala lies off the south-east coast of Mendanao, from which it is separated by Nado passage, nearly three-quarters of a mile in breadth. Nado passage seems completely barred by rocks, and both northward and southward of its entrance are many outlying dangers

Hoog island, or pulo Kumbong, is a small islet, 100 feet high, and in the form of a sugar-loaf, lying nearly 1½ miles northward of Ayer Lanchu; a reef surrounds this islet.

Pulo Batu Dinding lies off the north coast of Mendanao, from which it is separated by Nassi channel. On the western side of the island there is a bay, but it is much encumbered with coral shoals. Half a mile eastward from the north-eastern extreme of the island, is a small round islet, named Krak or Monjet.

See chart, No. 2,137.

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Nassi channel is navigable for small vessels only, owing to its being barred at either end; on the bar the depths are 2 fathoms; within the bar, from 5 to 9 fathoms.

Langgir or Rotterdam island, half a mile in length, lies three-quarters of a mile westward of the north-west point of Batu Dinding; at 4 cables west of it is a low islet. A bank of sand and rocks surround both island and islet, between which and the reef extending from Batu Dinding is a narrow channel with 6 to 9 fathoms water.

Caution.—The whole coast between pulo Mendanao and Tanjong Bienga, the north-west point of Belitung, is fronted by dangers, and vessels should use caution in approaching it; the outlying dangers only will be described.

Karang Salat, or Perlak shoal, is a rocky shoal nearly awash, situated 2 miles north of Hoorn island, and in the northern approach to the inshore passage mentioned on page 447. Sunken patches lie from 3 to 4 cables north-west and south-east of it. From this shoal the two north points of Batu Dinding are in line, bearing W. ½ S., and the eastern extreme of Hoorn island S.S.E. Between it and Batu Dinding north-east point is a sunken rock, and a patch of 5 fathoms or less.

Pulo Kelmanbang is a small island lying 6½ miles E. ¾ N. from the north-east point of Batu Dinding. It is surrounded by a reef, which on the east side extends nearly one mile.

Jumangin shoal is a small coral shoal situated 6 cables westward of Kelmanbang, on the west side of which a white buoy, with ball, is moored in 6 fathoms, with the east point of Hoorn island bearing S. by W., and the south extreme of pulo Kelmanbang E. by N.

Batu Pinang lies about one mile off the south and south-east sides of pulo Kelmanbang. Its outer edge lies south of the west end of that islet, with a detached reef at 4 cables west of the extreme.

Batu Tuku is partly dry at low water, and lies north-westward of pulo Kelmanbang, distant about one mile.

A white nun buoy, with ball, is moored in about 10 fathoms, off the north-west side of Batu Tuku, with the east extreme of pulo Kelmanbang bearing S.E. ½ S., distant about 1¾ miles. A white nun buoy, with ball, marks the north extreme of Karang Tenga, north extreme of Batu Tuku.

See **chart, No. 2,137.**

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Jumangin and Tuku shoal buoys mark the east side of the north entrance of the Inshore passage (p. 447), between Mendanao and Belitung islands.

A bank of coral, half a cable in extent, with a least depth of 2 fathoms, lies on the south side of the approach to Cheruchup bay, with Kalmoa islet bearing E. ¼ S., distant 6½ miles.

CHERUCHUP BAY and RIVER.—This bay lies northward of pulo Kelmanbang and Batu Tuku, between the latter and Karang Baka. Cheruchup river falls into the eastern part of the bay, but reefs extend off its entrance to a distance of 5 miles.

Settlement.—The fort lies on the north bank of the river, at one mile within the entrance, with the town of Pandan close northward of it.

Supplies.—Coal.—Water.—The water, which is brought from a little way up the Cheruchup river, is very good; it may be procured also on the right bank of the river, near the entrance, but it is not so good. There is a Dutch coal depôt on Kalmoa islet, whence small supplies may be obtained.

Mails.—The fortnightly steamer between Batavia and Singapore touches here.

Beacons.—Kalmoa islet, 150 feet high, lies on the south side of the Channel between the reefs, and one mile from the entrance point of the river. On the north side of the island stands a white pyramidal beacon, visible from a distance of about 12 miles in clear weather.

White buoys mark the south side of the approach to the anchorage and black buoys the north side, as follows :—

A white beacon buoy, with ball, is moored close to the north-west side of a small coral reef, with three fathoms water, near the middle of Cheruchup bay, with Kalmao islet bearing E.S.E., distant 3¾ miles.

A similar buoy is placed off the north-west side of the spit forming the south side of the channel, 1¾ miles E.S.E. of it.

Karang Baka, the westernmost shoal on the north side of the bay, has a depth of one fathom, with 6 fathoms close-to. A black beacon buoy, with ball, marks its south-west side, with Kalmoa islet bearing S.E. ¾ E. distant nearly 4½ miles.

A patch of 7 feet lies half a mile north-east of Karang Baka, and there are several shallow patches between it and the shore

See chart, No. 2,137.

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A black nun buoy, with ball, marks the south-west extreme of Karang Mangkok. Besar, which has a least depth of 1¾ fathoms, and situated S.E. ½ S. 1½ miles from Karang Baka. Between it and the land there are numerous shallow heads.

The entrance of the river, within these buoys, is marked on the starboard hand by eight stake beacons with triangles, the beacon on Kalmoa island and three stake beacons with triangles, within; on the port hand by a stake beacon with two balls, and eleven stake beacons each with one ball. The buoys and beacons are not to be depended on.

Anchorage.—Directions.—The best anchorage is about midway between the inner black and inner white buoys, with Kalmoa island bearing S.E. by E. ½ E., and the west extreme of Kelmanbang island S.W. by S., in depths of 6 or 7 fathoms, sand. Vessels, however, can anchor westward of all the buoys in 11 to 13 fathoms about 5 miles from Kalmoa islet.

Cheruchup bay affords no safe anchorage in the north-west monsoon, and even during the north-east monsoon there are occasional heavy gales from the north-west. It is advisable to moor, as variable streams in the anchorage are liable to cause a foul anchor.

Directions.—To enter this bay, having passed Ayer Lanchu, the west point of Mendanao at a distance of 2 miles, steer N. by E. till Rotterdam island bears S.S.E., then steer E.N.E. till Kalmao island bears S.E. by E. ½ E.; thence direct for that island until the west extreme of Kelmanbang bears S.W. by S., and anchor in about 7 fathoms.

When near the north-west point of Batu Dinding island, in the south-west monsoon period, the wind will sometimes shift to the eastward; in which case, if bound to this bay it is better in a sailing vessel to anchor and wait for the sea breeze from the southward or south-westward, as the current runs to the north-west with an easterly wind.

Tanjong Bienga is a high bluff point, forming the north-western extreme of Belitung island; from this point the coast trend-north-eastward.

Argo shoal, about one mile in extent, with one foot least water, lies 4 miles northward of Karang Baka; from its centre, Tanjong Bienga bears N.E. ½ E.; and Tanjong Kubu, on which are some high trees, S.S.E.

See chart, No. 2,137.

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Several patches exist in the neighbourhood of Argo shoal, for which, *see* the chart.

ELEVEN ISLANDS are a cluster of small islands lying off the north-western extreme of Belitung. The names of the most important are Lutong, Bambu, Sampit, and Burong; the latter is the largest of the group, and lies 3 miles north-eastward of Tanjong Bienga, at nearly one mile off shore.

Langkuas (North-west) island is the westernmost of the Eleven islands, and lies 2½ miles off shore.

For the description of the coast eastward of the Eleven islands, *see* page 474.

LIGHT.—From a lighthouse 215 feet high, painted white, on Langkuas island, is exhibited at an elevation of 200 feet above high water, an *intermittent white* light. The light is fixed for *sixty seconds*, eclipsed *twenty-five seconds*, *flash* for *ten seconds*, eclipsed *twenty-five seconds*; the whole occupying *two minutes*. It is visible seaward between the bearings of N. 2° E. and S. 86° W. (except where obscured by islands) from a distance of 20 miles.

Alwina shoal (originally reported by the ship *Alwina* in 1858), is a patch of 3 fathoms or less, with 15 to 16 fathoms close-to, and lies with Langkuas lighthouse bearing S.S.W., distant 1¼ miles.

A patch of 4¾ fathoms lies three-quarters of a mile E. by S. from Alwina shoal.

Towards the shoals on the western side of the entrance to Stolze channel, approaching from the southward, the depths are much less than those on the eastern side, and they decrease more regularly, the 10-fathoms line extending some 5 or 6 miles to the eastward of them, so that they may be approached by proper attention to the lead. Near the Shoal-water group, the 10-fathoms line extends a little more than half a mile to the eastward of the shoals, and consequently those dangers must be approached with greater caution.

Depths of 9 to 10 fathoms will bs found on the bank extending about 3 miles eastward and south-eastward of Vansittart shoals.

Between White rock and Gresik island, in Stolze channel, the depths are greater on the eastern side, and shoaler on the western side, than in the fairway.

See chart, No. 2,137.

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A bank, with 8 to 11 fathoms, extends 2 miles S.S.E. from Ayer island.

The bottom through the entire length of Stolze channel appears to be composed principally of sand and broken shells, with here and there broken coral. North-westward of Belitung island the bottom is mostly soft black mud, with sand, broken coral, and shells in places.

DIRECTIONS.—Stolze channel from the southward.—As soon as Beluru (Blantu), the highest hill on the south-west coast of Belitung, can be recognised, it should be brought to bear about N. by E.; and with it just in sight on that bearing, if the weather be clear, a vessel will be about 33 or 35 miles distant from it, and in the fairway, with Carnbee rocks about 13 miles to the north-eastward, and may shape a course for Stolze channel.

As the vessel proceeds to the northward, Luda hill will come in sight, and shortly afterwards Pyramid and South peak, all of which will be seen to the eastward of Beluru. Soon the Haycocks will be visible, at first a little to the left of Beluru, and by the time they are in line with it, Gunong Bolo, on the south extreme of pulo Selio, will be well in sight, distant about 15 miles. Shoal-water island lighthouse will also be in sight.

When abreast of White rock, Ayer island will be seen nearly ahead, and Kalangbue on the port bow; soon the Lima islands will be seen on the starboard bow, and as they are approached Gresik island will be seen ahead.

Gresik island should be approached on a N.N.W. bearing until Ayer Lanchu lighthouse bears N. by E., which will lead between Gresik island and the reefs extending northward of the Lima islands. When the north side of Ayer island opens northward of Gresik, steer direct for Gaspar island, between Hewitt and Akbar shoals; or vessels can pass between Akbar shoal and the coast of Belitung. *Continued on* p. 463.

Working through.—From the southward, standing to the eastward, towards Carnbee rocks, Beluru hill must not be brought northward of N. by E.; and to clear Naga reef, Anvang bank, and Cooper shoals, Gunong Bolo must not be brought westward of N. by W. Near Three-feet shoals, Gunong Bolo must be kept eastward of N. by E.

See chart, No. 2.137.

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The dangers southward of pulo Selio should not be approached under a depth of 15 fathoms, or White rock brought to the westward of N. by W.; and when Gunong Bolo bears eastward of N.E. ½ E., White rock must be kept to the eastward of North, to avoid the edge of the bank which lies south-eastward from it. White rock should not be approached nearer than one mile, nor to a less depth than 14 fathoms; when northward of White rock it must not be brought anything southward of E.S.E. until the north point of pulo Selio bears E. by N. ½ N., to clear Tiga rock. Njela bank should not be approached under a depth of 10 fathoms, or White rock brought southward of S.E. by S.

Gunong Bolo kept eastward of S.E. by E. will lead southward of Njela bank, and south-westward of the foul ground between it and the Lima islands. Kasenga island bearing North, leads westward of the dangers extending from Ross island; and Ayer Lanchu lighthouse bearing eastward of North, will lead westward of the rocks which extend from Kasenga, and also westward of all dangers northward of the Lima islands. When Gresik island bears West, a vessel will be northward of the reef extending from Kasenga and may stand eastward until the lighthouse bears N. ½ W.

Abreast of pulo Ayam, Ayer Lanchu lighthouse must not be brought to the westward of North. To clear the reef surrounding Hoog island, the lighthouse should not be brought to the southward of S.S.E. until Langgir island bears N.E; Hoog island, in line with the lighthouse, leads westward of the dangers extending from Langgir island.

The dangerous coast of Belitung, between Mendanao and Langkuas lighthouse, should not be approached under 6 miles, unless bound to Cheruchup bay.

Standing to the westward, Shoal-water island, if not brought to the eastward of North, will lead eastward of all the shoals southward of it, and the lead will also give good warning when standing towards them, as they lie some 4 or 5 miles within the edge of the 10-fathoms line. Shoal-water and Hancock islands must be approached with caution, as the lead does not give much warning when nearing their ledges; they should on no account be approached within a distance of 2½ miles. Hancock island bearing South leads eastward of Bliss shoal, between which and Ayer island a vessel may stand to the westward until the summit of that island bears N.N.E., which will lead eastward of Vansittart shoals.

See chart, No. 2,137.

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Kalangbue island bearing W. ½ S. leads southward of the dangers extending from Ayer and Gresik islands. The east side of Gresik island may be approached to one mile; but the east side of Klemar island has a rock lying one mile off, which will be avoided if Gresik island is not brought eastward of S.S.E. The summit of Ayer island, in line with the east extreme of Klemar island, leads 1½ miles eastward of Hewitt shoal. *Continued on* p. 463.

Coming from the northward, the preceding directions should be reversed.

NORTH-EAST COAST OF BANKA.*

The mariner cannot be too cautious in approaching this coast, and must use every precaution not to get entangled among the outlying dangers when running for Gaspar strait in thick weather.

Aspect.—Of the many hills on the north-east coast of Banka the principal are, the Saddles, 912 feet high, situated about 10 miles westward of Berikat point; the Pading mountains, the summit of which is elevated 2,630 feet at 10 miles westward of the Saddles; and the double-peaked mountain, Gunong Maras (Crown peak), 2,300 feet high, at about 20 miles within the north coast of the island.

The coast from Berikat point trends 25 miles in a westerly direction to Langka point, 3 miles westward of which is Koba village. Timor island lies about 2 miles off shore, at 6 miles eastward of Langka point. Eastward of Timor island the shore may be approached to depths of 6 or 7 fathoms, but westward of the island reefs extend from 2 to 3 miles off shore. About 16 miles northwestward from Langka point is the large village of Kerow, whence the coast trends in a northerly direction to Sungi Marawang, on which the towns of Rusa and Punkal Pinang are situated. Reefs extend from 15 to 20 miles off this part of the coast.

Koba road, 2 miles westward of Langka point, affords anchorage in 4½ fathoms, with the mouth of the river bearing S. ½ W., distant about 3½ miles. Nearer the shore is Guntreng reef and other patches, westward of which the 3-fathom edge of the bank fronting the shore extends 3 miles off.

ISLETS AND REEFS.—Tetawi bank.—Fronting the coast between Kerow village and Sungi Marawang is a chain of banks from

* *See* chart of Gaspar strait, No. 2,137; Banka strait, No. 2,597; and No. 2,149.

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one to 5 miles in breadth, known under the general appellation of Tetawi bank, upon which are several scattered islands. Many patches on these banks dry at low water.*

Barat rock, with 5½ feet water, lies nearly 2 miles northward of Langka point, with the flagstaff at Koba village bearing S.W. ¼ W.

Pulo Buar, the south-eastern of the islets, lies 11 miles northward of Langka point, and is surrounded by a reef, which in places extends to the distance of one mile. Many rocky patches lie westward of the islet.

Horse rocks, with depths of 2 to 6 feet, lie with pulo Buar bearing W. ¾ N., distant 2¾ and 3¼ miles. A patch of 1½ fathoms lies 2¼ miles north-eastward of the westernmost Horse rock, with pulo Buar bearing W. ¾ S., distant 4½ miles.

Mentawa reef, with less than 6 feet water, lies 2 miles N.E. by N. from pulo Buar.

Goat shoal, with one fathom water, lies 3½ miles N.N.E. of Mentawa.

Pulo Pasir, pulo Johora, and pulo Tetawi are islets on Tetawi bank, situated respectively at 4, 6, and 8 miles westward of pulo Buar.

Pulo Panjang, the largest island, is situated about 7 miles east-south-eastward from the entrance of Marawang river.

Pulo Bojur lies about one mile eastward of pulo Panjang; both islands are surrounded by extensive reefs. A patch of 4 feet lies with the south-west extreme of pulo Panjang bearing N.E. ¼ N., distant one mile.

Inshore channel.—George rocks.—Between Tetawi island and the Banka shore is a passage with from 3 to 4 fathoms water, used by small vessels trading between Koba village and Sungi Marawang; George rocks, two rocky patches 6 cables apart, lie in the middle of it; from the eastern rock pulo Panjang bears N. by W. ⅛ W., distant from 5¼ to 6 miles.

OFF-LYING REEFS.—Fathool Barie shoal is the southernmost of several patches which are steep-to, lying from 15 to 22 miles off shore; it has a depth of 6 feet water, and lies with pulo Panjang

* *See* charts, No. 2,597 and No. 2,149.

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bearing W.S.W., distant 8 miles. Diederika shoal, with a depth of $1\frac{3}{4}$ fathoms, lies 2 miles N.N.E. of it.

Hydrograaf rock, the northernmost of this group, is 33 yards in extent, steep-to, and has a least depth of $1\frac{3}{4}$ fathoms, with 9 to 13 fathoms around. It lies with Riah hill bearing W. $\frac{1}{2}$ N., distant $14\frac{1}{2}$ miles.

Palmer reefs, two patches of 7 and 9 feet, and one mile apart, lie respectively S.W. $\frac{1}{2}$ S., $3\frac{1}{4}$ miles, and S.W. $\frac{3}{4}$ W., distant $3\frac{1}{2}$ miles from Hydrograaf rock.

Hydrograaf reef, the easternmost of this group, is 2 cables in extent, nearly awash, steep-to, and lies 9 miles S.E. by E. from Hydrograaf rock.

A patch of $4\frac{1}{4}$ fathoms lies nearly 5 miles E. by S. from Hydrograaf reef.

Noordziek shoal, about 3 cables in extent, steep-to, with a least depth of $1\frac{3}{4}$ fathoms and 10 to 14 fathoms around, lies about 2 miles south-west of Hydrograaf reef.

A patch of 2 fathoms lies 2 miles south of Noordziek shoal.

Between Fathool Barie and Hydrograaf rocks and the shore are the following shoals:—Roberts rock with a depth of 2 fathoms; General Elliot reef and Sullivan rock, which dry; Malan Tete or Black rock reef, with 3 feet water, and numerous others, with from 5 to 7 fathoms water between them; their positions will be seen by consulting the chart.

Tanjong Riah, situated 11 miles northward of Sungi Marawang, is a cliffy point distinguished by two hills; extensive reefs project off its south-east and south sides, which makes it necessary to give it a berth of about 8 miles.

Tate rocks, 14 feet high, lie $5\frac{1}{2}$ miles south-eastward of Tanjong Riah; Pulo Panjang, kept westward of South, leads eastward of Sullivan rocks and the dangers inshore of it.

MARAWANG ROAD affords anchoraage in depths of 3 to 4 fathoms at about 4 miles off the entrance to Sungi Marawang; caution is necessary when approaching it on account of the surrounding dangers.

See charts, No. 2,597 and No. 2,149.

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Marawang or Pinkal Pinang, the chief town of one of the tin districts, is situated on a branch of Sungi Marawang, about 6 miles above the entrance. The town of Rusa is on the main river about 9 miles from the sea.

Supplies.—Good water can be obtained at Pankal Pinang, and medical attendance by application to the Dutch official in command.

Directions.—Vessels bound from Gaspar strait to Marawang road, having rounded Berikat point at the distance of 2 or 3 miles, shape course about N.W., passing between Sittard shoal and Horse rocks; when pulo Buar bears S.W. by S., and pulo Panjang West, the course to be pursued will be best seen by consulting the chart.

When approaching from the northward, bring pulo Panjang to bear S. ½ W., keeping it on that bearing until Sharp peak, the north-western peak of the Lapa mountains, bears S.W. ¼ W.; then steer direct for it, until pulo Tetawi is just open westward of pulo Panjang, bearing S.E. by S.; then anchor in 4 fathoms, with the mouth of Sungi Marawang bearing West.

LIAT BAY, formed between Tanjong Riah and Tanjong Laiang, affords good anchorage with shelter from southerly and westerly winds, about three-quarters of a mile off shore; in the easterly monsoon the swell is heavy.

The town of Liat stands a short distance up the river of the same name, and is a chief town of one of the tin districts.

Water.—Fresh water is difficult to procure here, on account of the rocks in the mouth of the river, which can only be passed at high water; even then there is at times a heavy surf on them, which makes the entrance dangerous for boats. Wood and spars of any dimensions may easily be obtained on the south side of the bay, within half a mile of the shore.

Liat rocks, about 6 cables in extent, with the centre awash at low water, lies E. by S. ½ S. distant 3½ miles from Tanjong Laiang; close to the rocks there is a depth of 6 or 7 fathoms.

Circe reef, with 2½ fathoms, and 6 or 7 fathoms around, lies 2½ miles south-eastward of Liat rocks, with Riah hill bearing

See charts, No. 2,597 and No. 2,149.

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S.S.W. ¾ W. distant 4⅓ miles. A shallow patch lies about three-quarters of a mile north-westward of Circe reef, in the direction of Liat rocks.

Karang Pedis, with a depth of 3 fathoms, and apparently 9 to 10 fathoms around, lies with Malan Tete or Black rock reef bearing S.S.W. ¾ W., and Puak hill open southward of Riah hill.

Anchorage.—The usual anchorage in Liat bay, is in 4¼ fathoms, stiff clay, with the mouth of Sungi Liat W. by N., and Tanjong Laiang N.W. by N.; southward of the river is a fine sandy beach.

Tides.—It is high water, full and change, in Liat bay at 5 hours, springs rise 9 feet.

Directions.—Approaching Liat bay from the northward, a depth of about 7 fathoms will be found at 2 miles from Tanjong Laiang, decreasing towards the anchorage.

Coming from the eastward, bring Tanjong Riah to bear S.W. by W., and steer towards it till Tanjong Laiang bears N.W. ½ W., then steer N.W. by W. towards the anchorage.

The Coast from Tanjong Laiang trends northward for 12 miles to Tanjong Tuing, a cliffy point with a hill, and the islet of Pongul close-to. The coast to the southward forms a shallow bay, in which, at 5 miles from Tanjong Tuing, is the small island, pulo Simbang, connected to the shore by a reef.

There are no known dangers immediately off this coast beyond the distance of 2 miles. Iwan reef, 14 miles eastward of pulo Simbang, is described with the outlying dangers, page 462.

The coast from Tanjong Tuing trends north-westward for 10½ miles to Tanjong Grasak, the northernmost point of Banka, where it turns sharply to the westward. For coast to the westward, *see* page 429.

DANGERS NORTHWARD AND NORTH-WESTWARD OF GASPAR STRAIT.

Canning rock, lies directly in the route of vessels proceeding towards Gaspar strait.

This rock is about half a cable in extent with a least depth of 3 fathoms, and 17 to 20 fathoms close-to. It lies with the summit of

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See charts, Nos. 2,137 and 2,149.

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Gaspar island bearing W. by S. distant 10¾ miles. Vessels from the northward should approach Gaspar island bearing about S.W., until within 5 miles of it, in order to give this danger a wide berth.

Warren Hastings reefs extend about 2½ miles in a north-east and south-west direction, with depths of 2 to 9 feet. Between and around them there is a depth of 16 fathoms. The centre of these reefs lie with Gaspar island bearing S.E. by E. distant 8½ miles.

Belvedere rock, 10 feet high and about 40 feet in extent, is situated on the southern part of a reef of about one mile in extent, some parts of which are dry at low water; with a heavy swell the sea breaks on them, and by day they may be avoided by keeping a good look-out.

Tree reef, awash at low water, lies S. by W. ¾ W. distant 1¾ miles from Belvedere rock.

Tijong reef, the southern of the dangers formerly known as Belvedere shoals, lies S.S.W. ½ W., distant 4 miles from Belvedere rock. Sunken rocks lie within 1½ miles between a north and west bearing from Tijong reef.

Sittard reef lies with the peak of Gaspar island bearing S.E. by E. ½ E., distant 24 miles. It is 4 cables in extent, with a least depth of 1½ fathoms, and 12 to 18 fathoms close around.

Magdalena reef consists of two rocky pinnacles, half a cable apart, with a least depth of 2½ fathoms, and 14 to 19 fathoms between and around. The summit of Gaspar island bears S. by E. ¼ E., distant 23½ miles from the reef.

Reefs.—Captain F. G. Crantz, of the *Dido*, reported in 1882 as having passed half a cable to leeward of a small reef, upon the south side of which breakers were visible. Position given lat. 1° 55′ S., long. 107° 14′ E., or N.E. by E. ½ E. about 15 miles from Magdalena reef. The *Oromaso*, an Italian vessel, reported the existence of a sandbank about 7 cables in extent with probably about 2 fathoms water over it, in lat 1° 50′ S., long. 107° 30′ 45″ E. The vessel passed within half a mile of it, but took no steps to ascertain whether it was a bank or not.

See charts, Nos. 2,137 and 2,149.

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Lanrick or Soembing shoal.—This danger reported by H.N.M. surveying vessel *Soembing*, is about one cable in extent and steep-to, with a least depth of $1\frac{1}{2}$ fathoms and 18 to 20 fathoms around. It lies with Gaspar island bearing S. by E. $\frac{1}{4}$ E., distant 33 miles, or about 4 miles westward of the reported position of Lanrick shoal, which position has been expunged from the charts.

Severn shoal, is 2 cables in extent, steep-to, with a least depth of $1\frac{3}{4}$ fathoms, and 17 to 18 fathoms around. It lies in the track of vessels from Toli island towards Gaspar strait, in lat. 1° $37\frac{1}{4}'$ S., long. 106° $31\frac{1}{2}'$ E.

Severn shoal is probably identical with Actæon rock on which H.M.S. *Actæon* struck in 1857, about 7 miles east-south-eastward of the above.

Iwan reef, 2 cables in extent, has a least depth of $1\frac{3}{4}$ fathoms with 14 fathoms close around. It lies W. by S. $\frac{1}{4}$ S. distant 13 miles from Severn shoal, and the same distance from the coast of Banka.

Celestial reefs, are the south-easternmost of a group of reefs extending 16 miles in an east and west direction, consisting of three patches occupying a space half a mile in extent; the least water is $1\frac{3}{4}$ fathoms, situated in lat. 1° $12\frac{1}{4}'$ S., long. 106° $46\frac{3}{4}'$ E.

Between and around these reefs, which are steep-to, the depths are from 18 to 22 fathoms.

Deva reefs, consist of four shallow heads, about one mile in extent, and steep-to, lying about 2 miles northward of Celestial reefs.

Wild Pigeon, lying about 5 miles westward of Celestial reefs, consists of two shoal patches half a cable apart, and each half a cable in extent; the least depth is one fathom, with 16 to 19 fathoms around.

Hawkins reef, $1\frac{1}{2}$ cables in extent and steep-to, has a least depth of $4\frac{1}{2}$ fathoms, with 16 to 19 fathoms around. It lies 7 miles north-westward of Celestial reefs. A patch of $1\frac{3}{4}$ fathoms lies 2 miles south-eastward of Hawkins reef, about midway between Wild Pigeon and Vega reef.

Vega reef consists of two shoal patches one cable in extent and steep-to, with depth of 3 and 4 fathoms.

See **charts, Nos. 2,137 and 2,149.**

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Ingram reef, is 3 cables in extent, steep-to, has a least depth of 4 feet, with 17 fathoms around, and lies 3 miles westward of Vega reef. Ingram reef is the north-western reef of this group, and 13½ miles distant from Celestial reefs. A patch of 4¾ fathoms lies 4 miles westward of Ingram reef, and a patch of 7 fathoms is charted nearly 2 miles northward of Ingram reef.

Caution.—This neighbourhood must be navigated with great caution, and the whole group of reefs should be given a wide berth.

Emerald Isle shoal, on which the American ship *Emerald Isle*, drawing 22 feet, touched, lies approximately in lat. 0° 59′ S., long. 107° 2½′ E.

Soundings were tried for immediately by that vessel after passing over the shoal, but bottom was not reached although discoloured water was distinctly visible where the ship had touched. It was also unsuccessfully searched for by H.M. surveying vessel *Egeria* in 1890, but is still retained on the charts.

DIRECTIONS.—From Gaspar strait to the northward.—These directions chiefly apply to sailing vessels, as steamers usually take the direct route. Most vessels bound to the northward from Gaspar strait prefer passing eastward of Gaspar island, which is the safer route; but some, especially when bound to Singapore by Rhio strait, prefer the less safe but more direct route between the shoals westward of that island. *Continued from* pp. 441 and 454.

To proceed eastward of Gaspar island, with a fair wind, a vessel should pass about 3 miles eastward of that island, and 6 or 7 miles westward of Canning rock. Having passed Gaspar island, steer to the northward until it bears S. ¾ W., upon which bearing it should be kept as long as it can be seen.

This track leads about 4 miles westward of the shoal reported to lie 15 miles north-eastward of Magdalena reef; caution must be exercised when in the locality until its existence is disproved, and also of the Oromaso, still farther eastward.

If the wind should prevent a direct course from being steered, Gaspar island should not be brought westward of N.N.W. until the vessel is northward of Akbar shoal; and, after Gaspar island is passed, it must be kept S. ¾ W. as before.

See charts, Nos. 2,137 and 2,149.

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To proceed westward of Gaspar island.—From a position about one mile westward of Glassa rock, steer North until the peak of Gaspar island bears S.E.; when a N.W. course will lead between Warren Hastings reefs and Tijong shoal; but great caution must be observed in the localities of these dangers. When Berikat point bears S. by W., a vessel will be westward of Warren Hastings reefs and Tijong shoal, and a N. by W. or N.N.W. course, according to the set of the stream, will lead westward of Magdalena reef and Soembing shoal, and eastward of Severn shoal, whence course must be shaped to avoid the Celestial reef group.

If circumstances prevent a straight course from being steered when northward of Gaspar island, keep its summit between the bearings of S.E. by S. and S.E. ½ E., which will keep the vessel clear of Warren Hastings and Tijong reefs.

Berikat point bearing S. by W., leads westward of Warren Hastings reefs and Tijong shoals, and Gaspar island bearing S.E. leads 5 miles eastward of Sittard shoal; but when westward of Warren Hastings reefs and Tijong shoals it will be wise to edge away to the northward—always carefully guarding against tidal streams or currents,—taking care not to bring Gaspar peak to the southward of S.S.E., to avoid Magdalena reef and Soembing shoal.

If proceeding between Berikat point and Boompjes island, the point may be passed at the distance of 2 or 3 miles, and the island at one mile; then proceed to the N.N.W., taking care not to bring Boompjes island to the southward of S.E. by S., to avoid the south-west extreme of Warren Hastings reefs. Berikat point bearing S. by W. leads westward of those reefs; and bearing S. ½ E. leads eastward of Sittard reef.

The passage near the Banka coast is so beset with dangers, and others may exist of which at present nothing is known, that vessels are advised to give this coast a wide berth, especially as nothing is to be gained by approaching it. At page 459 directions are given to proceed along this coast to Marawang road.

Approaching Gaspar strait from the northward.—In consequence of the northern entrance of Gaspar strait being so near the Equator, the winds, even in the strength of the monsoons, are very uncertain, producing a corresponding uncertainty in the

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c charts, No. 2,137 and No. 2,149.

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direction and force of the tidal streams and currents. A sailing vessel approaching the strait from the northward will, therefore, have to be principally guided by the winds and currents which she may herself fall in with rather than by relying upon experiencing those which are mentioned as most likely to be met with at certain seasons.*

In thick weather it will always be an anxious time for the navigator whilst approaching Gaspar strait, for unless good sights can be obtained he can never be certain of his exact position; it is advisable under such circumstances to steer for Banka strait, where, by obtaining soundings on the edge of the bank extending from the Sumatra coast, he will be enabled to proceed with comparative safety, although he may be quite unable to distinguish the land.

Vessels returning from Singapore or China early in the north-east monsoon, when the wind is generally North or N.W., and intending to go through Gaspar strait, usually pass between Toli and Dokan islands, off the north coast of Banka; a little later in the monsoon the wind is more easterly, and it is then better to pass from 10 to 20 miles eastward of Toli.

Having passed Toli island, steer about S.E. by E., so as to get on the meridian of Gaspar island before reaching the parallel of 1° 50′ S. Gaspar island is visible in clear weather at a distance of 30 miles. When seen, bring it to bear S. ¾ W., and steer for it on that bearing until within 5 miles of it; then pass eastward of it, and steer to the south-westward for the entrance of the Macclesfield channel, the one usually taken.

The above directions apply only to sailing vessels returning from China early in the north-east monsoon. In general, and especially returning late in the monsoon from China, when south-east and easterly winds are often met with between Banka and Belitung, it will be better to pass from 10 to 12 miles westward of St. Barbe island, and endeavour as soon as possible to get on the meridian of Gaspar island. When that island is seen, bring it on a S. ¾ W. bearing and proceed as before.

Returning from China late in the monsoon, S.S.W. winds are often met in the southern part of the China sea, obliging vessels to pass between the islands near the west coast of Borneo. If this should happen in May or June, it would be tedious work getting to the southward; in such a case steer for the north-west extreme of Belitung and pass through Stolze channel.

See charts, No. 2,137 and 2,149.

* *See* the description of winds and currents, pp. 25, 26 and 28; also p. 467.

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CHAPTER IX.

CARIMATA OR KARIMATA STRAIT.

VARIATION in 1896.

Carimata strait ... ... 2° 20′ East.

CARIMATA STRAIT.—General description.—Carimata strait, the easternmost of the channels leading from the Java sea into the China sea, lies between Belitung or Billiton island and the west coast of Borneo, and is 115 miles in breadth. The Montaren islands and reefs extend for about 40 miles eastward of Belitung, and the Carimata and other groups extend for about 50 miles south-west of Maya island, lying close to the Borneo coast, thus reducing the main strait to a breadth of about 45 miles, and in the fairway of which are the Ontario and Flying Fish reefs.*

Carimata strait is the customary route from Bali strait or East Java for vessels bound to the Straits Settlements or China; it is also used by sailing vessels from Malacca strait, proceeding to China in the strength of the north-east monsoon period, by the Eastern passages. Although much broader than either Banka or Gaspar straits it is not so much frequented as either of those channels by vessels proceeding to and from China by way of Sunda strait; but it is, however, not unfrequently used by sailing vessels returning from China, which from the effects of winds or currents find it difficult to get to the westward.

The great breadth of Carimata strait, compared with the others, is of great advantage to vessels working, but this is partly counterbalanced by the several shoals which lie in or near the fairway and out of sight of land, as well as irregular currents, necessitating a dependence being placed on the reckoning. Notwithstanding, Carimata strait is a very serviceable fairway, and since the publication of the chart of that strait, resulting from the surveys of H.M. surveying vessels, and those of His Netherlands Majesty, the mariner may take it with more confidence, but a careful look out should be kept for any possible unchartered dangers.*

* *See* chart of Carimata strait, No. 2,160.

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Besides the Main channel, limited to the north-eastward by the Carimata islands, and to the south-westward by the Montaran islands and Belitung, there are several other channels between the numerous islands lying eastward and north-westward of Carimata, and between it and the Borneo coast; the eastern of these known as Greig and Inner channels, have a regular tide, and convenient depths for anchoring, and are therefore much frequented by vessels working through the strait; it being quite impossible to work through the Main channel against a strong monsoon, and a continuous rapid current setting to leeward.

Vigias.—With regard to reported shoals, Lieut. Hoskyn, commanding H.M. surveying vessel *Flying Fish*, remarks, that on three different occasions whilst at work in the neighbourhood of the Greig and Gwalia shoals, large floating masses of vegetable matter and other débris were fallen in with. One of these was so large that it could be seen from the bridge at a distance of 7 or 8 miles, and so dense that at a moderate distance it might readily have been mistaken in daylight for a rock. Another bore a striking resemblance to a small sandbank with a bush on it, and was visible from 5 to 6 miles.

Winds and Weather.—*See* pp. 25, 26, and for rainy season, p. 16.

Currents.—The currents in Carimata strait depend greatly on the strength of the wind. During the strength of either monsoon, the current, when accelerated by the tidal stream runs from 2 to 3 miles per hour with the wind; when the monsoon is light and the tidal stream is against the wind there is little or no current, and the tidal stream at times overcomes it. Also on p. 28.

Tides.—In the fairway between the Montaran group and Carimata island, and in the southern part of the strait, the flood runs to the north-westward and the ebb to south-eastward; southward of Borneo and Belitung, the flood runs to the westward and the ebb to the eastward; northward of Belitung the flood runs from W.N.W. to West, and the ebb from East to South-east. At Serutu island, Carimata group, the flood runs West and the ebb East. On the west coast of Borneo, from Sambar point, the flood runs from North to N. by W., as far as Sukudana, where it meets the flood stream from the China sea running southward past Pontianak, through Greig and Inner channels. This fact should be borne in mind when working against the monsoon through these channels.

See chart, No. 2,160.

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There appears to be but one high water in the 24 hours; as a general rule, during the north-west monsoon it is high water about 9h. in the morning, and during the south-east monsoon about the same hour at night, so that ebb tide may be looked for in the north-west monsoon, and flood tide in the south-east monsoon, during the day. The rise at springs is about 6 feet, neaps 3 feet; increased during westerly monsoon by about 2 feet.

See more recent remarks on tides in these seas, on p. 28.

Pilots.—The fishermen on both sides of Carimata strait appear to be well acquainted with the shoals in their own neighbourhood but from their little knowledge of other than small craft, few are able or to be trusted to take other vessels into the rivers. Away from their own neighbourhood they are of no use, beyond being quick of eye to discern shoals that a vessel may be approaching.

SOUTH, EAST, AND NORTH COASTS OF BELITUNG, WITH THE ADJACENT ISLANDS AND DANGERS.*

The whole of these coasts are fronted by many islets and dangers, and as those adjacent to the coast are out of the ordinary track of navigation, vessels are advised to give them a wide berth. The latter, with the coast, will first be described, followed by the Schaarvogel islands and the reefs bordering the main strait.

BELITUNG or BILLITON ISLAND, about 43 miles in diameter, forms the western side of Carimata strait. The island is unusually flat, and wooded, with several scattered mountains, but no ranges of them. The north coast is higher and more rocky than the east and south-east sides. The island is but thinly populated, and few inhabitants will be seen except in the mining districts. Fishermen will be met with along the coast, and at the Montaran islands, but they with their families live in boats, and move about to different localities. They are quite harmless, and it is stated will assist shipwrecked mariners. The population of Belitung island is about 32,000, including 8,000 Chinese miners.

Landmarks.—The hills north-eastward of Tanjong Krawang, the south-west extreme of Belitung island, attain an elevation of 1,000 to 1,207 feet, but will not often be seen by vessels passing southward of White island; Rotan island, of the Schaarvogel group,

* The west coast of Belitung island is described on pp. 446–453. *See* chart, No. 2,160.

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is visible about 18 miles in clear weather, and Meleidong island near the coast, north-westward of Rotan, has a remarkable hill visible about 20 miles; these are useful marks for vessels northward of Schaarvogel islands, or that are rather far to the westward of the fairway track. Burung Mandi, 1,417 feet in height, near the east point of Belitung, has two peaks, and is a conspicuous mark On the north coast is Kelapa Kampit and the Sekaju hills 17 miles apart, with some lower hills between them.

Sekaju, 558 feet high, has a crater-like top, with a bare patch of red stones on its eastern side. Kampit is 705 feet high, conical, and easily recognised. Tajem Bini and Tajem Laki, the highest peaks of Belitung situated 14 miles from the north shore of the island, are two very sharp peaks, each 1,673 feet in height and conspicuous marks in clear weather.

SOUTH COAST.—From Tanjong Krawang, the south-west extreme of Belitung, the coast trends eastward for about 14 miles to Tanjong Lingka, the west point of Balok bay, whence it trends sharply to the northward. This coast should not be approached within 4 or 5 miles, on account of off-lying shoals and islets. At about 2 miles within Tanjong Lingka, is Belitung hill, 410 feet in height, and about 12 miles north-eastward is Mengarun, 774 feet high, with Tung peak eastward of it, forming useful marks in clear weather.

BALOK BAY, between Lingka and Kalumpang points, is about 11 miles wide, and to Balok river at its head is about 8 miles deep. The bay is encumbered with shoals, but the most dangerous of those bordering the channel to the settlement are marked by beacons, which affords easy navigation to those locally acquainted.

Dindang, the settlement lies on the eastern side of the bay, near the head, off which at one mile distant there is anchorage in 3½ to 4 fathoms, mud.

From Dindang there are roads to the principal towns in Belitung.

Umpang islets and reefs, occupy a space 4½ miles in length in the fairway of the approach to Batok bay. Between these islets and the dangers extending 2 miles westward of Kalumpang point, the channel is about 3 miles wide, with depths of 4 to 6 fathoms. Rocks above water extend also about 1½ miles south-eastward of Kalumpang point.

The channel westward of Umpang islets is 2 miles wide.

See chart, No. 2,160.

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Beacons.—A beacon with ball marks the north-east extreme of Umpang islet reefs, and a similar beacon marks the west extreme of the reef at 2 miles northward of it. Two beacons with cross pieces mark the middle ground westward of the latter; thence to the settlement, beacons with triangles mark the east side, and beacons with balls the west side of the channel. These must not be depended on.

Directions.—Approaching Balok bay it is advisable to make Ketapang island, which is visible from about 16 miles, thence shape course to pass eastward of Umpang islands beacon, then altering course as necessary between the beacons.

Coast.—Anchorage.—From Balok bay the coast trends eastward for 6 miles to Batu Itam point, north-eastward of which is a bay about 4 miles deep, with Liendang, Tepi, and other islands lying eastward of it. The shores of the bay are foul to the distance of half a mile, and its head is mostly foul, but there is a narrow passage between the fringing reef, with a depth of 3½ fathoms to 4 fathoms within. This bay affords anchorage in the north-westerly monsoon season, in 4 to 6 fathoms mud, about 1½ miles southward of Sembulu islet; access from the southward is easy, keeping towards the western shore to avoid the shoals lying about 2 miles south-eastward of Tepi island.

EAST COAST.—Tapok point is the eastern point of the bay just mentioned. Sekapar island lies 2 miles eastward of it, beyond which, at about the same distance, are two small reefs. From Tapok point the coast trends northward for 16 miles to Samak point, and the coast between is foul in places to the distance of 6 miles.

Merai islands and reefs lie midway between Tapok point and the Schaarvogel islands. The large island is about one mile in extent, with islets and reefs extending 2 miles eastward, and 6 miles to the north-eastward; a shallow patch also lies about 2 miles S.S.W. of Merai island. Between that island and Tepi island, is a group of islets and reefs 2 miles in extent, with a beacon (liable to be washed away) on the southern shoal of the group.

Selanduk island, about 2½ miles in length, lies nearly 5 miles northward of Tapok point, and 1½ miles off shore, the passage between being only available for boats.

Ne chart, No. 2,160.

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Selanduk may possibly be recognized by a solitary tree standing on the hill over the east point of the island, if it still exists.

Meleidong island lies 2 miles eastward of Selanduk, and has several shallow patches from one to 1½ miles southward of it. There is a channel with 5 to 6 fathoms water between Meleidong and the Ajam islets lying eastward of Selanduk, which is used by the mining company's steamers calling at Lingang river, 3½ miles westward of Selanduk.

Meleidong is a conspicuous and useful mark for avoiding the dangers northward of Schaarvogel islands. It has a remarkable hill on its north extreme, which is visible from a distance of 20 miles in clear weather. Selumar hill, 551 feet high, 4 miles westward of Medong point, is possibly also a useful mark.

Anchorage.—There is anchorage at about 2½ miles off Lingang river in 3 fathoms water; in approaching it, the north extremes of Meleidong and Selanduk should be passed within half a mile, to avoid the shoals lying 1½ miles north-eastward of these islands, northward of which the ground is foul. The Belitung tin mining company have beaconed the shoals between Meleidong and Selanduk, but they are not to be depended on.

Samak point, situated 9 miles northward of Selanduk island, and the point just northward of it, forms the eastern extreme of Belitung island. A hill stands on Samak point, and the town of Manggar, situated about 4 miles up the river of that name, lies about 1½ miles north-west of the hill.

Reefs.—From Samak point, reefs in the form of a crescent, extend about 12 miles in a south-east direction, to within 3 miles of West Protet reef (p. 477). The chart must be consulted for further information on these dangers, the neighbourhood of which should be avoided by strangers.

Bakau Lemau, situated 6½ miles eastward of Manggar river, is a flat wooded island, with a coral reef extending one mile in a south-east direction, dry at low water; the other sides are steep-to, but have outlying rocks.

Siadung island, a low thickly wooded islet, one mile north-east from Bakau Lemau, is surrounded by reefs to the distance of a mile.

See chart, No. 2,160.

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Madau reef, about half a mile in extent, upon which is a sandbank having some brushwood on the centre, lies with Burung Mandi point bearing W. ½ N. distant 5¾ miles. A shallow patch lies N.W. ½ N. nearly 2 miles from it.

NORTH COAST.—The north coast of Belitung is generally high, and has many peaks useful as landmarks for ascertaining a vessel's position in fine weather. Tajem Bini and Tajem Laki, about 14 miles from the north coast of Belitung, are each 1,673 feet in height, as before stated. Fishing villages will be found at the mouths of the small rivers, but they are of little importance, and afford no supplies.

Mandi point and hill.—From Manggar river the coast trends northward for about 5 miles to Burung Mandi point, over which is Menang hill; at 2 miles westward of it is Burung Mandi, a table topped hill with two peaks, and 1,417 feet in height. From the point the coast takes a north-west direction for about 17 miles to Buding bay and river. Between Samak and Burung Mandi points the coast is dangerous to approach within 3 or 4 miles, but north-westward of the latter, guarding against some isolated shoal patches, it is safe to approach within 1½ miles.

Kelapa Kampit, 705 feet high, is situated about 7 miles south-westward of Pering river.

Reefs.—A patch of 4 feet, with 6 to 8 fathoms around, lies 2 miles off shore, with Burung Mandi bearing S.W.

A sandbank, dry at low water, lies 2½ miles off shore, with Burung Mandi bearing S. ½ W. A sunken rock lies three-quarters of a mile westward of it.

Several shallow patches lie from one to 1½ miles north-eastward from Kluang point, east point of Pasyran river; also at 1½ miles off shore, about 2 miles north-westward of Pering point.

Pigeon island (pulo Kanis) is a small island lying nearly 4 miles north-eastward of Pasyran and Pering rivers. A reef extends half a mile south-east, and nearly one mile north-west of it, and a patch of one fathom lies about one mile S. by E. of the island.

BUDING BAY, at about 10 miles west from pulo Kanis, is 2 miles in breadth. From Buding point, on the eastern side, a reef

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extends three-quarters of a mile into the bay, and with the reef extending from the western shore reduces the portion which has depths of 3½ to 4 fathoms, to the breadth of half a mile; from these depths the bay gradually shoals to 1½ feet at the entrance to Buding river, distant about 2½ miles.

Reefs extend nearly 2 miles off the coast eastward of Buding point, and about 2½ miles north-eastward of Kerupit, the west point of entrance, between which there are depths of 6 to 7 fathoms, leading to the anchorage. At 6 miles N.E. ½ E. from Buding point lies a reef with one fathom water, and steep-to; and at 3¾ miles N. ¾ W. from the same point is a coral patch, with 2¾ fathoms, also steep-to.

West channel.—Beacons.—Between Kerupit point and the off-lying shoals is a channel, marked by beacons, surmounted by triangles on starboard hand and balls on port hand, but they are not to be depended on. The entrance is between the barrier reefs at about half a mile eastward of Keran island.

Anchorage.—There is anchorage in Buding bay in 3½ fathoms, mud, with Buding point bearing E.N.E., distant about one mile, and the east side of Keran island touching Kerupit point.

Town.—Buding town is situated 4 miles up the river, and is the principal town of the district from which tin is exported.

Directions.—Approaching Buding bay from the north-eastward, bring Buding point to bear S.W. by S., and steer for it, until the sandbank on the reefs 2 miles north-east of Kerupit point, bears N.W.; then alter course to W. by S. ½ S., until the west point of Buding river bears about S. ¾ E., when steer for it until the east extreme of Keran island touches Kerupit point, anchoring in about 3½ fathoms.

From the westward, coasting steamers with local knowledge pass inside the reefs by a channel situated half a mile eastward of Keran island, where in the fairway there are depths of 7 fathoms; thence passing half a mile off Kerupit point between the beacons, two on each side, thence south to the anchorage.

COAST.—Keran island lies 3 miles westward of Buding river, and one mile off shore, and has several tall straggling trees. It is

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encircled by a reef, which extends 4 cables eastward, and nearly one mile westward.

Mulut island, situated 4 miles westward of Keran, and one mile off shore, appears from the offing as a small rounded hill, with two remarkable trees on the summit. The island is connected by a reef with Bulu island, 3 miles to the westward, and nearly to Keran island reef to the eastward.

A reef with one fathom water and steep-to, lies $4\frac{1}{3}$ miles North from Mulut island; Juro Dajong rock, with a depth of 5 feet, lies N.N.E., distant $1\frac{3}{4}$ miles, and a similar reef lies N.N.W. $\frac{1}{2}$ W. distant $2\frac{1}{4}$ miles, from the same island.

Tanjong Siantu, 6 miles westward of Mulut island, may be recognised by a conical hill, and also a small conical-shaped wooded islet off it; the ground is foul for about one mile seaward of the point, and a patch of 3 fathoms lies $2\frac{1}{2}$ miles N.N.E. $\frac{1}{2}$ E. of the point.

The islets Babi and Bulu, eastward of Tanjong Siantu, are merely rocky shoals, covered with vegetation.

Sekaju hill, 558 feet high, with a crater-like top, lies 4 miles southward of Tanjong Siantu; a useful mark on this coast.

Coast.—From Tanjong Siantu the coast takes a westerly direction for about 10 miles to the north-west extreme of Belitung, abreast of which are the Eleven islands; thence the coast trends southward into Gaspar strait, *see* page 453. The whole of this coast is fronted with islets and reefs to the distance of $2\frac{1}{2}$ miles, and it is advisable to give it a wide berth.

The British ship *Empress of China* was reported to have struck on a reef, in 1877, in lat. 2° 24′ S., long. 107° 49′ E., or about $7\frac{1}{2}$ miles north of Siantu point.

Batu Malan Saluting is an isolated patch of 2 fathoms, lying with Tanjong Siantu bearing S.E. by E. $\frac{1}{2}$ E. about 4 miles. A similar reef lies W. $\frac{1}{2}$ S. about 4 miles from Batu Malan Saluting, and about midway between it and Alwina shoal.

Sijuk, the chief town of the district of the same name, is situated at the mouth of a river about 4 miles westward of Tanjong Siantu.

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ISLANDS AND DANGERS ON WEST SIDE OF CARIMATA STRAIT, AND IN THE FAIRWAYS.

A description of that portion of the dangers southward of Belitung, which lie contiguous to Gaspar strait, is given at pp. 445, 446. The following islands and dangers lie nearer Carimata strait, and are important to vessels approaching it from the southward.

KEBATU, or Shoe island, is situated about 31 miles southward from Kalumpang, the south point of Belitung island; it is 346 feet high, 2 cables in length by 1½ cables in breadth, conical in shape, thickly wooded, and steep-to, with a fringing reef extending from a half to one cable. This island, situated on the western side of the south entrance to Carimata strait, and being visible in clear weather from a distance of 23 miles, forms an excellent object to make for when entering the strait from the south-westward.

White island, 57 feet high, wedge shaped and of a white colour, having a few stunted trees on the top, lies one mile south-west from Kebatu island. A shoal with 6 feet water, and steep-to, lies 2 cables north-east from White island, with a depth of 10 fathoms between.

Zephyr rock, nearly dry at low water, and on which the sea enerally breaks, is steep-to, and lies 6 cables N.N.W. from White island.

Karang Kawat, or Grace reefs, on which the sea breaks heavily in moderate weather, consist of two coral patches, the centres of which lie N.N.E. ¾ E. distant 4 and 6 miles respectively from Kebatu island.

These reefs are each about 3 cables in extent, with from 12 to 16 fathoms at less than a cable distant all round. The northern reef dries 4 feet, and the southern is awash at low water.

Between Kebatu island and Grace reefs there is a channel 3¾ miles wide, with depths of 14 fathoms, mud.

Ketapang island, lying about 8½ miles southward from Kalumpang, the south point of Belitung, is a low, swampy, but wooded island about a third of a mile in diameter, and surrounded by a reef, which on the eastern side extends to the distance of 2 cables, with depths of 8 and 9 fathoms around it.

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The tops of the trees are visible from a distance of about 16 miles, and form a good landmark for Balok bay.

SCHAARVOGEL ISLANDS, situated from 12 to 20 miles south-eastward of Tapok point, are low, thickly wooded, (the tops of the trees being about 100 feet high) and surrounded by reefs and sandbanks; many of these dangers are steep-to, the lead giving no indication when approaching them.

There is a passage through the group, both east and west of Penerus island, situated 3 miles S.S.E. of Rotan, and also westward of Rotan island.

Rotan, the northern island, is the largest, and has, or had, a remarkably tall tree near its centre, visible from a distance of 18 miles; reefs extend about 3 miles north-east and south-west of the island. Pengapiet, the south-eastern island, is divided into two parts by a channel dry at low water.

The three eastern islands are named Langke, Lung, and Ayermasin, Langke being the southernmost. Patches of coral extend about 4 miles north-eastward, and 3 miles south-westward of the group, and there are many detached patches north-eastward and eastward of the Schaarvogel islands.

Sandbanks extend several miles north-north-east and in an opposite direction from Schaarvogel islands or parallel to the Belitung coast, with general depths of 8 or 9 fathoms of water, but there are several isolated and dangerous coral reefs on them. Between these banks are channels with depths of 15 to 20 fathoms, mud, or sand and mud. Tide rips may generally be observed over this irregular bottom, and with fresh breezes some of the reefs will be seen to break. It is advisable to pass well to the eastward of the dangers now to be described.

East Protet reef, having one fathom water, and 12 fathoms around, generally breaks. It is 3 cables in length, one cable in width, and lies with the centre of Rotan island bearing S.S.W. $\frac{3}{4}$ W., distant $14\frac{1}{4}$ miles; strong ripplings have been observed about 2 miles north-eastward of the reef.

Shallow patches also lie S.S.E. $\frac{3}{4}$ E., distant $2\frac{3}{4}$ miles; S.W. nearly 3 miles; South $6\frac{1}{2}$ miles; S. by W. $\frac{1}{2}$ W. $6\frac{1}{2}$ miles, and a patch of $3\frac{1}{4}$ fathoms South $8\frac{1}{2}$ miles, all from East Protet.

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West Protet reef with $1\frac{3}{4}$ fathoms water, lies W. by N. $\frac{1}{2}$ N., distant $2\frac{1}{2}$ miles from East Protet.

OUTLYING DANGERS.—Osterly reefs, consist of five shallow coral patches, all of which are steep-to and generally marked by breakers.

North Osterly is a small patch nearly dry at low water, and lies with the high tree on Rotan island bearing W. $\frac{3}{4}$ N. distant 15 miles.

A patch of $3\frac{3}{4}$ fathoms lies W. $\frac{3}{4}$ S. distant $2\frac{1}{2}$ miles, and a patch of one fathom lies nearly West, distant $4\frac{1}{4}$ miles from North Osterly.

East Osterly dries at low water, and lies S. by E. distant $3\frac{1}{3}$ miles from North Osterly.

South Osterly reef lies S.W. $\frac{3}{4}$ W., distant $1\frac{3}{4}$ miles from the east reef. It is two cables in extent, with a dead coral islet about 40 feet in length, and about 3 feet above high water.

Tides.—Near the Osterly reefs the flood runs north-westward, and the ebb about south-south-eastward. In November and December no flood stream was observed. The rise of tide at springs is about 5 feet.

Bower shoal, discovered by the *Nassau*, 1876, is a coral patch three-quarters of a cable in extent, having a depth of $1\frac{1}{2}$ fathoms, and steep-to; it lies $6\frac{1}{2}$ miles southward of South Osterly reef, with the centre of Rotan island bearing N.W. $\frac{1}{2}$ W., distant $19\frac{1}{2}$ miles. It stands near the middle of a narrow sandbank of 6 to 10 fathoms, extending 12 miles in a north and south direction. South Osterly reef stands on the north extreme of this bank.

Discovery West bank (Ayer Masin), lying nearly 14 miles south-eastward of Bower shoal, in lat. 3° 39′ S., long. 108° 46′ E., is composed of coral, 7 cables in length by 2 cables in breadth, having a small portion barely covered at high-water springs. There are depths of 5 to 17 fathoms around the bank at a distance of one cable.

Discovery reef lies N.E. by E. distant $5\frac{1}{2}$ miles from Discovery West bank; it is 2 cables in diameter, having several coral heads barely covered at high water, and 14 to 22 fathoms at the distance of one cable.

Discovery East bank (Gusong Mampango), lying E. by N. nearly 26 miles from Discovery West bank, is $4\frac{1}{2}$ cables in length,

See chart, No. 2,160.

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1½ cables in breadth, and having in its centre a decayed white coral ridge 5 feet above high water; there are depths of 16 to 17 fathoms, sand, around this bank, at a distance of one cable.

Discovery East bank is visible from aloft on a clear day at a distance of 7 to 8 miles. Birds make their nests here, and may generally be seen hovering about the bank.

Karang Juruk (Lavender bank), lying N.W. ¼ W., distant 15 miles from Discovery East bank, with Rotan island bearing W. by N. ¼ N., is 9 cables in length, 2 cables in breadth, and composed of coral, with several large black boulders awash at high water; around this bank there are depths of 15 to 20 fathoms, sand and shells, at the distance of one cable.

During a south-easterly breeze the sea on Lavender bank has been observed to break from aloft at a distance of 6 miles.

Karang Batuan, lying N. ½ W., distant 9 miles from Karang Juruk, is half a mile in length and one cable in breadth.

A black rock, near the centre of the bank, which dries for about 50 yards, is barely covered at high water. The depths around the bank are from 21 to 27 fathoms.

Cirencester shoal lies with Merajah island, of the Montaran group, bearing N.W. ¾ N., distant 22 miles, and the same distance northward of Karang Batuan. It is half a cable in extent, with a least depth of 2 fathoms, and 13 to 17 fathoms close around. The water about the bank is not discoloured, but tide rips may usually be seen.

A patch of 4¾ fathoms lies 1½ miles S.S.W. of Cirencester shoal.

Doubtful reefs.—Townsend reef, passed at the distance of 2 cables by the steam vessel *Galley of Lorne*, is stated to be about one cable in length, and appeared to have but little water over it, on which the sea broke. It is charted in lat. 3° 0′ 30″ S., long. 109° 5′ E., 10 miles south-eastward of Cirencester shoal. A reef awash, on which the German vessel *Stephan* grounded in 1884, is reported to lie in about lat. 3° 7″ S., long. 109° 17′ E., or with Karang Batuan bearing S.W. by W. ⅓ W. distant 20 miles. As no observations were taken to determine the position of the vessel when aground, the position of Stephan reef, and even its separate existence from dangers

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already known, must be considered doubtful. It was unsuccessfully searched for by H.M. surveying vessel *Egeria* in 1890. (*See* Vigias, p. 467.)

MONTARAN ISLANDS consist of a group of islets, sandbanks, and coral reefs, extending 40 miles in an easterly direction from the north-east coast of Belitung. They are all uninhabited, but are frequented by the fishermen from the neighbouring coast of Belitung. With the exception of Nangka the islands are low, and are all covered with vegetation.

Between the islands are many dangerous coral reefs, steep-to, and the whole group must be considered unsafe navigation for any but small craft. All vessels should pass eastward of the islands and their outlying dangers.

Tides.—It is high water, full and change, about 9h. 40m. in the morning during the north-west monsoon, and the same hour in the evening during the south-east monsoon; rise from 4½ to 6 feet. (*See* page 467.)

WEST GROUP.—The west Montaran group consists of eight islands, and several rocks above water.

Nangka island, the most prominent of the Montaran islands, is 1¼ miles in length by three-quarters of a mile in breadth; it rises in two densely wooded peaks, which at a distance appear like two separate islands. The southern peak is 549 feet high, and the northern peak 415 feet high.

This island is surrounded by a coral reef, which, on the north side extends half a mile off. A sunken rock lies three-quarters of a mile north-east of the island.

Sembilan, situated about three-quarters of a mile westward of Nangka, is a sandy islet covered with trees and surrounded by a reef, leaving a narrow passage between the islands.

Foul ground exists for one mile westward of Sembilan, and a small coral reef, with 6 feet water and steep-to, lies S. ½ W., distant 1½ miles from the island.

Three islands lie close together southward of Nangka island. Sekumpul, the northernmost, is distant about 2 miles, and Telegapat or Gampal, the southernmost and largest, about 3½ miles from the

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south end of Nangka island. These islands are low, consisting merely of mangroves, and other trees (from 90 to 100 feet high) growing on coral reefs. At 2 miles west of the south point of Telegapat is a reef with less than 6 feet water.

A reef, situated about 2½ miles east of Telegapat, is nearly 2 miles in length; on its south end is a patch of dead coral 3 feet high.

Maranai or Napier island is densely wooded, three-quarters of a mile in length, 90 feet high, and surrounded by coral reefs, which on the north and north-west sides extend about three-quarters of a mile, and on the east and south-east sides nearly 2 miles.

A reef of 3 fathoms lies with Maranai island bearing N.E. by E. ¼ E. distant 2 miles.

Gusong Baru, situated on a reef about one mile east of Maranai island, is small and sandy, with a few trees, 26 feet in height.

Sadung or South island, about 2½ miles south of Maranai island, is a sandbank surrounded by a coral reef, and covered with trees. The passage between it and Maranai island is blocked by reefs which occasionally break.

Bakau island, about 4 miles westward of Sadung, is low with bushes near its centre. A small sandy islet with some trees lies a short distance from its north-east point. A reef extends 1½ miles E.S.E. from the island, and also half a mile north-west.

Paperak island, situated about 1½ miles south-eastward from Bakau, is small and densely wooded. A reef about one mile in extent, with 2 to 3 feet water, lies one mile west of the island, and several coral patches exist between the island and Burung Mandi point.

Lenore reef, situated N.W. ¾ N. distant 3½ miles from Maranai island, is a small coral reef with 1½ fathoms water, and steep-to.

A coral patch of 3 fathoms and 19 to 22 fathoms around, reported to lie one mile N. by W. of Lenore reef, apparently has no existence.

A reef, with 3¾ fathoms, lies 2½ miles E.N.E. of Lenore reef.

West Lenore reef is 3½ cables in length, by 2¼ cables in width and lies S.W. ¾ W., distant 8½ miles from the south hill of Nangka island; it has 2 fathoms water, and from 15 to 21 fathoms close around.

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Corcyra reef, about half a mile in diameter, with 1½ fathoms water, lies with the south peak of Nangka island, bearing E. by N. distant 4 miles.

Hydrograaf reef, extending one mile in a north-west and south-east direction and about 4 cables wide, has a least depth of one fathom, from which mount Tajem Laki bears S.W. ½ W., and the south peak of Nangka island, East. The reef is steep-to, with depths of 14 to 17 fathoms within one cable.

Gusong Serlang, one mile in length and 3 cables in width, has a bank of brown sand above high water on its north-west part, from which Pigeon island bears W. by S. ¾ S. distant 6½ miles. Depths of 12 to 16 fathoms were found close around this reef.

Nearly midway between Gusong Serlang and Bakau island, are two detached coral patches, having one fathom water.

MIDDLE GROUP.—Merajah island, the largest of the Montaran Middle group, is low, flat, and covered with mangroves. The fringing coral reef extends in places to the distance of half a mile.

Bulian or Big tree island is 151 feet high, the highest of the Middle group, thickly wooded, and surrounded by a coral reef which extends half a mile north-west and south-east from the island.

Tempuling is a small islet situated one mile west of Bulian island.

Berisi or Channer island, half a mile west of Merajah, is similar to Tempuling, having reefs extending 3 cables from its north and south points.

Warren reef is a small bank of red coral 5 feet high. Shallow patches lie about three-quarters of a mile north and south of Warren reef, and a similar patch 2 miles W. by S. of it.

Gubbins reef is a large reef, having near the middle a bank of dead coral 3 feet high. This reef is nearly connected with the Middle group by two other reefs. At 1½ miles eastward of Gubbins reef is another large reef, with detached heads off it.

Luctor reef.—A patch dry at low water, lies about 2 miles W. by S. ½ S. of Gubbins reef, with a patch of 3¾ fathoms, on which the

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Luctor struck, at 1¼ miles N.W. ¼ N. from it. A patch of 2½ fathoms is charted about one-third of a mile south-west of the dry patch.

Pesemut or East island is the easternmost of the Montaran islands. It is about half a mile in extent, of coral formation, thickly wooded and surrounded by a sandy beach. The trees in the centre form a sharp pointed clump 112 feet high, making the island conspicuous and easily recognised when seen from a distance. Isolated coral patches extend one mile off the south-east part of the island.

Tuan or Small island, 66 feet high, situated 1¾ miles south-westward from Pesemut island, is about one-third of a mile in length, and covered with a few stunted trees; it is surrounded by a reef which extends about half a mile from its north-west and south-east extremes.

Justina reef, half a mile in length, has a sandbank above high water, one cable in extent, on its south end, with Pesemut island bearing W.N.W. distant 1½ miles.

Whittingham reef, lying 2 miles N.E. by E. ½ E. from Pesemut island, is small, with 2½ fathoms water. In the centre of the triangle formed by this reef, Pesemut island and Justina reef, is a small patch of 1½ fathoms.

Catherine or Evans reef, about 2 cables in extent, has a least depth of one fathom, with Pesemut island bearing W. ¾ N., distant 4½ miles. Patches of 4 and 6 fathoms lie about half a mile north-eastward of it. This danger is steep-to with depths of 8 to 15 fathoms around, and is rarely indicated by breakers or discoloured water.

Condor reef consists of two small coral patches 2¼ cables apart, north-east and south-west, the southern patch having 2½ fathoms, lying with Pesemut island bearing E.S.E., and Nangka south peak bearing S.W. by W. distant 10 miles. The edges of the reef are steep-to, and it has not been observed to break.

Flying Fish bank, with a least depth of 3 fathoms, lies with Nankga island peak bearing S. by W. ⅛ W., distant 18 miles. Within a distance of half a mile are several patches of 8 and 10 fathoms; beyond this distance the depth is over 20 fathoms.

See chart, No. 2,160.

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Ontario reef, composed of dead coral, is about 2½ cables in length, and at half tide a patch of spiral rocks about 20 yards in diameter uncovers. It lies with Carimata peak bearing N.N.E. ¾ E. distant 28¼ miles, and nearly in mid-channel between the Carimata and Montaran islands.

A patch of 5 fathoms lies half a mile north of the reef with irregular bottom to the distance of a mile, beyond which the depths are from 15 to 22 fathoms all around.

Soundings are no guide in approaching Ontario reef, and the sea does not always break, it is therefore advisable to give the reef a wide berth.

Florence Adelaide reef, composed of coral and stones, with 1¾ fathoms at low water, extends 3 cables in a north-east and south-west direction, with a breadth of 2 cables. At the distance of half a cable eastward there is a sand patch with 6 fathoms; and farther eastward at the distance of 2 miles, depths of 13 and 15 fathoms, over sand, were obtained, with 20 fathoms, mud bottom, close-to; on the north and south sides it is steep-to, with 17 to 20 fathoms, sand and mud, at the distance of one mile. No indication of the reef was observed at 2 cables distant. Position, lat. 2° 4′ S., long. 108° 5′ E.

THE CARIMATA or KARIMATA ISLANDS lie on the eastern side of the main fairway of Carimata strait, and extend for a distance of about 50 miles south-westward from Maja island on the coast of Borneo.

Carimata, the largest island, is about 11 miles in extent east and west, 7 miles north and south; near its centre is a peak rising to an elevation of 3,378 feet high, which in clear weather can be seen from a distance of 55 or 60 miles, but as a general rule it is obscured by clouds. The peak is in lat. 1° 36′ 18″ S., long. 108° 54′ 29″ E. On the south-west end of the island are some hot springs.

Reefs extend off the east and south coasts of Carimata from 5 to 7 miles in places, but the north side is comparatively clear.

Besi island is situated about 4½ miles off shore, on the south side of the reef extending eastward of Carimata island. It has a tower shaped rock on its flat summit. Isolated reefs extend a further distance of 4 miles eastward and north-eastward of Besi island, the neighbourhood of which should be avoided.

See chart, No. 2,160.

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At 6½ miles S.S.E. from the south point of Carimata island is a gravel bank, having 4 fathoms water. About midway between the outer edge of Gravel bank and the west point of Carimata, are some rocks with less than 6 feet water. Two islets lie off the bay on the west side of Carimata island, with patches of reef between them; the eastern islet is 280 feet in height.

Anchorage.—During the south-east monsoon, there is good anchorage in 12 to 14 fathoms, mud, off the north side of the island, westward of the north point. Sailing vessels should not stand nearer to the shore than to bring the south point of Pyramid or Buan island in line with the north point of Carimata island.

During the westerly monsoon there is anchorage in 6 fathoms off the south side, north-eastward of Gravel bank, at about 2½ miles from the shore; also at about one mile southward of Besi island in 7 fathoms, mud.

There is a small village, in a creek upon the south shore of the island, S.E. by E. from the peak of Carimata, inhabited by about 200 fishermen, and a few Chinese.

Surong Gading island, rocky and 790 feet high, lies 3 miles westward of the north-west point of Carimata. A reef extends nearly half a mile southward of it.

Vessels should not use the channels between any of the islands lying between Surong Gading and Caramata island, as there are many reefs among them, and the streams are strong.

Bliang is a round conical island, 1,293 feet high, lying between Surong Gading and Carimata; it can be seen for 30 miles or more, and forms a good mark, as it nearly always remains clear when the higher hills are obscured.

Serutu island, about 7 miles in length east and west, 1½ miles in breadth, 1,575 feet high, and visible 28 or 30 miles off in clear weather, forms the north-eastern limit of the main channel of Carimata strait. On the western point of the island is a hummock, which has been mistaken for a small island, and named the Quoin from its appearance. It is fairly steep-to all round, apparently.

Anchorage.—Water.—There is good anchorage off the north side during the south-east monsoon, in about 11 fathoms. At a

See chart, No. 2,160.

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sandy beach on the south side of Serutu, and near the east point, there is a good watering place, but high tide is required for a large boat to get over a reef, near to which there is anchorage in 7 fathoms, mud. It is said, also, that fresh water can be obtained at the west end of the island (at the foot of a hill of moderate height) off which a vessel may anchor in 10 fathoms.

Genting, Mintano, and Gresik, are three islands, east and west of each other, situated E.S.E. distant 13½ miles from Carimata peak. These islands are thickly wooded, Mintano, the centre one being the largest. A dry sandbank extends 1¾ cables northward from Gresik, but there is no other danger, depths of 8 and 9 fathoms being found around and between the several islands.

Tongue islands.—Bakong, the northern island of the group is a small wooded hummock with a surrounding reef having three islands upon it. About 1½ miles north-west of Bakong lies a reef extending 2 miles north and south, having 6 feet water.

Other detached coral reefs lie between this group and Carimata.

Lising island is low and flat, with a reef extending nearly 4 cables south-eastward, upon which are three small islets.

Boom island is a round-shaped wooded islet, steep-to all round

Steil island, the easternmost of the group, has a reef extending 3 cables north-west of it. A reef with 4 fathoms water, and about one mile in extent, lies one mile northward from Steil island.

Osterly channel, the passage between the reefs extending eastward of Carimata island and Lising, is intricate, being obstructed by many shallow patches, between which the stream runs with strength. Vessels should not use this channel, but pass eastward of Steil island.

Buan or Pyramid island, the remarkable conical peak of which is 1,017 feet high, lies 7½ miles north-eastward of Carimata island. A reef extends 4½ cables eastward from the island.

Ular and Nibung lie respectively W.N.W. distant 1½ miles, and E. by S. three-quarters of a mile from Buan island, with channels between them having depths of 8 to 12 fathoms; both these islands are rocky and have a few trees upon them.

See chart, No. 2,160.

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A reef, which occasionally breaks, lies nearly 2 miles E. by S. from Nibung island, with apparently foul ground between.

Jamsetjee shoal, composed of coarse sand and stones, has a least known depth of 5 fathoms, and lies with Buan island peak bearing E.S.E., and Bliang peak S.S.W.

Leman islands, are a group of rocky islands lying 15 miles north of Carimata island. Pako, the easternmost island is the largest and 164 feet high, with a reef extending to the northward about 6 cables. Budi, the western island, has a rounded appearance, and is covered with verdure.

The channel between Budi and the eastern islands of the group is one mile wide, with a depth of 14 fathoms; but the channels between the other islands are narrow and obstructed by reefs.

FAIRWAY SHOALS.—Gwalia shoal is the southernmost of a group of coral shoals extending about 14 miles in a north and south direction, and situated north-westward of the Leman islands. It is a round coral patch about 2 cables in diameter, with less than 6 feet on it at low water, from which Budi, the western Leman island bears S.E. by E. $\frac{1}{2}$ E. about $21\frac{1}{2}$ miles. The depths around the shoal are from 7 to 10 fathoms.

Erickson shoal, about 2 cables in extent, with a least depth of $4\frac{1}{2}$ fathoms, lies about 3 miles north-west of Gwalia shoal, with depths of 7 to 11 fathoms at one cable distant.

Twilight reef lies N.E. by N. nearly 5 miles from Gwalia shoal.

China shoal lies about 6 miles N. $\frac{3}{4}$ W. from Erickson shoal; it is about 5 cables in length, 3 cables in breadth, and the depth of water varies from less than 6 feet to 4 fathoms.

South Greig shoal is a small patch of coral with 5 fathoms water, lying 2 miles north of China shoal.

Middle Greig shoal, with 2 fathoms water, is about 2 cables in length, and steep-to on the south and west sides, there being 10 to 14 fathoms close to its outer edge; on the north and east sides the depths are more gradual.

See chart, No. 2,160.

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North Greig shoal, the northernmost of this group, is a small patch with 4 fathoms water, and 11 to 13 fathoms at the distance of one cable. It is situated 2 miles N.N.E. of Middle Greig, and 13½ miles N. by W. from Gwalia, the southern shoal of the group Position, lat. 0° 52½′ S., long 108° 32½′ E.

Caution.—The shoals embraced between the Gwalia and North Greig shoals, rise from a depth of 10 to 13 fathoms. They are rarely visible either from the deck or mast head from the green nature of the surrounding bottom, and from the abruptness with which they rise the lead will seldom give sufficient warning to enable a danger to be avoided. Vessels are therefore recommended to give this neighbourhood a wide berth. On the western side of the reefs this may always be secured by keeping in depths of not less than 16 fathoms.

ISLANDS AND DANGERS EASTWARD OF CARIMATA ISLANDS.—Vogelnest (Birds Nest) islands, so named from being the resort of the birds which build the edible nests, are a group of five islands lying 20 miles E.S.E. of Carimata island ; between the eastern island and the others there is a channel 2 miles wide having from 9 to 13 fathoms. The islands are surrounded by reefs extending about 2 cables off.

Black rock, lies 4½ miles south-west of the Vogelnest group. Two rocks, also above water, lie half a mile south-eastward of Black rock. All these are steep-to, having from 9 to 11 fathoms at a short distance.

Krawang islets, three in number, are rocky, and a rock lies 2 cables W. by S. from the northern islet. Between the north and two south islets there are depths of 12 to 15 fathoms water. Between these islets and the Vogelnests, the depths are from 9 to 11 fathoms.

Papan islands consists of a group of six rocky islands thickly wooded, and divided into groups of three by a channel about one mile wide.

Meleidung, the eastern island, is the largest and affords good shelter on its east side during westerly winds, having also a convenient landing-place for boats in a small bay near the south extreme.

See chart, No. 2,160.

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Two islets lie northward of Meleidung, from the western of which a reef extends West one cable, having a rock over which breakers are usually seen.

The three islands of the western group lie in a north and south direction about half a mile apart; from the northern of these a reef extends westward 4½ cables, and from the southern island a reef extends southward about 3 cables.

Rob Roy rock with a depth of 15 feet, lies in Papan channel, with the south extreme of Meleidung island bearing S.E. ½ E. distant one mile.

Kate or Auckland rock, about one mile westward of Rob Roy rock, is 1½ cables in extent, with 7 feet water, and 12 to 14 fathoms, sand and mud, around. Its position is usually indicated by a ripple.

Gurong islands are two thickly wooded rocky islets situated about 10 miles north-westward of Papan islands. They stand on a coral reef which fringes the islands for a short distance, having from 12 to 14 fathoms close-to.

A rock about 160 yards in extent with 7 feet water, and 12 to 14 fathoms around, lies with East Gurong island bearing W. by N. ½ N. distant half a mile.

Tallack reef, of coral, about 160 yards in extent, with 2 fathoms water, and from 18 to 20 fathoms close around, lies with East Gurong island bearing E. by S. ¾ S., distant 5¾ miles.

Pelapi islands situated 7 miles north-westward of the Gurong islands, consist of four high rocky islands; the south-eastern and highest, attains an elevation of 1,181 feet.

Anchorage.—During the easterly monsoon there is good anchorage in from 8 to 9 fathoms, mud, midway between the two northern islands; a reef extends 2 cables from the north-east island towards the anchorage. There is a navigable channel between the north-west and south-west islands, but the other channels should not be used.

South-east of the group is an extensive mud flat, affording safe anchorage in 7 fathoms, during the westerly monsoon.

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* See chart, No. 2,160.

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Suka island, steep, rocky, and thickly wooded, lies 2 miles southward of the western Pelapi island.

Double island, situated one mile eastward of the north-east Pelapi island is 403 feet high, and appears as two islands when seen from a distance.

Siri island, lying one mile westward of Penebangan island, is 510 feet high, with a safe passage of 15 fathoms water between it and Penebangan.

Penebangan island, lying north-eastward of the Pelapi islands, rises to a peak 1,722 feet above the sea. This island lies within the edge of the bank of 5 fathoms and less, extending westward from Maja island.

Anchorage and water.—There is good anchorage at one mile off the north-western side of Penebangan, in 5½ to 6 fathoms, mud, with shelter from southerly winds. Freshwater bay, at this part of the island, has two runs of good water; the westernmost is the larger, and where water may be obtained behind a large black rock on the beach; the boats may approach close, or the casks can be landed on the beach, which consists of fine sand. There are four watering places on the west side, all of which are fronted by fine sandy beaches, and easily discerned.

There is good anchorage on the eastern side during the westerly monsoon, but a reef extends from the south point, which should not be approached within half a mile. The island abounds, or did formerly, in wild pigs.

Bulat and Burong islands, four in number, lying eastward of Penebangan island are low and thickly wooded.

Meledan or Button island, is a wooded islet, lying on the shore mudbank, with depths of 3½ to 4 fathoms around; it is a useful mark when navigating the Inner channel.

INNER and GREIG CHANNELS.—The passage eastward of the Papan islands and Penebangan, is known as the Inner channel, and is used by light draught vessels and coasters, when working against the monsoon; the depths are regular, being from 3½ to 4 fathoms, soft bottom, gradually decreasing to the Borneo coast; the shallow water makes it convenient to anchor to wait for a favourable tide or at night. (*See* directions, page 501.)

See chart. No. 2,160.

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Greig channel is the passage between Penebangan and the Pelapi islands. It is 2 miles in width and free from known danger. The route by this channel and among the islands to the south-eastward, although contracted in some parts, has moderate depths with generally good anchorage; and is, with Inner channel, the only route by which vessels may work against the monsoon, whether bound northward or southward.

WEST COAST OF BORNEO; SAMBAR POINT TO PONTIANAK, WITH THE ADJACENT DANGERS.

GENERAL DESCRIPTION.—Landmarks.—The west coast of Borneo is very low and almost uninhabitable. It is principally composed of a muddy slimy soil, which at high water is transferred in many parts into a morass.

There are a few isolated hills, the principal of which are mount Kedio, 1,707 feet high; Batu Jurang range, 689 feet; Minto hill, 328 feet, north-eastward of Kumpal or Rendezvous island; a mountain near Sukudana, 3,704 feet high, and a conspicuous mark in clear weather; Maja mount, 1,738 feet high, on Maja island; and Radak and Ambawang mountains, northward of Padang Tikar river, around which the coast is very low, forming the delta of Great Kapuas river. The tops of the trees, however, are visible from a distance of 12 to 14 miles.

On account of the swampy nature of the west coast of Borneo it is but thinly inhabited; Sukudana is the principal settlement in the southern part of Carimata strait.

Coast.—From Sambar point, the low south-west extreme of Borneo, the coast takes a northerly direction for about 45 miles to Minto hill, 328 feet high, with Kendawangan river lying about midway; thence it continues its northerly direction for about 27 miles to Ketapang river. At 35 miles beyond is Sukudana town and the Simpang river, which lie at the head of a large bay formed between the coast, and Maja island to the westward. Northward of Maja island several other large islands lie close to the coast, between which are Maja and Padang Tikar rivers; several smaller rivers lie to the northward of them, in the direction of Pontianak The whole of the coast between Kumpul island, lying about 25 miles off Sambar point, and Pontianak, may be safely navigated by ordinary attention to the lead and chart.

See chart, No. 2,169.

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Caution.—Numerous detached sand ridges, with little water on them, between which the current runs from 2 to 3 miles an hour at times, extend for about 30 miles southward of Sambar point, terminating in Fox shoal. Vessels should pass well to the southward of all these dangers.

SAMBAR POINT or Batu Titi.—This point has or had a large tree upon it, visible about 4 miles farther than the neighbouring wooded land, or about 16 miles.

Mangkap island, is situated 7 miles south-westward of Sambar point; the tops of its trees may be seen from a distance of about 14 miles in clear weather. A rock above water lies 4 miles S.E. of the island, and several others lie north-eastward of it. Vessels from the southward should not attempt to sight this island.

SHOALS off Sambar point.—Fox shoal, with a least depth of 2 fathoms, is situated with Mangkap island bearing N. $\frac{1}{8}$ E., distant 26½ miles. The shoal is one mile in length in a north-west and south-east direction, and is indicated by strong ripplings. Position, lat. 3° 30½′ S., long. 110° 11′ E..

Patches of 4¾ and 5 fathoms are charted 5 miles south-eastward of Fox shoal.

Hector bank.—The British Telegraph steamship *Recorder* reported as having in January, 1889, passed over the position formerly assigned to Hector bank (removed from the Admiralty charts in 1885, in consequence of its having been unsuccessfully searched for by one of H.N.M. surveying vessels), and obtained soundings of 7 to 8 fathoms, the extent of the bank being estimated as about 3 miles.

Mr. Madge, the commander, states that on previous occasions, when commanding the British Telegraph steamship *Agnes*, he had passed over Hector bank three times, the least depth then found being 5 fathoms.

Consequent on the above, Hector bank, with a least depth of 3½ fathoms, and 6 to 8 fathoms around (as originally reported), has been replaced on the Admiralty charts in lat. 3° 45½′ S., long. 110° 8¼′ E.

Hector bank was also unsuccessfully searched for by H.M. surveying vessel *Egeria*, in October 1890.

See chart, No. 2,160.

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Aruba shoal is a narrow bank 4 miles in length, with 2 fathoms water, steep-to, and generally indicated by ripplings; its centre lies with Mangkap island bearing N. $\frac{1}{3}$ E., distant 23 miles.

Clemencia reef, consisting of a ridge of hard sand 4 miles in length, and steep-to, has about one foot water on its shoalest part, from which Mangkap island bears N. by E., distant 20 miles. Breakers are nearly always to be seen on this reef.

A patch of $2\frac{3}{4}$ fathoms lies $7\frac{1}{2}$ miles N. $\frac{1}{2}$ E. from Clemencia reef, and one of $3\frac{3}{4}$ fathoms 6 miles in the same direction.

Linge shoal, consisting of hard sand, having a depth of $1\frac{1}{2}$ fathoms, lies with Mangkap island bearing N.W. $\frac{3}{4}$ N., distant $13\frac{1}{2}$ miles; the shoal is steep upon the northern side, but in other directions the water shallows gradually.

Banks.—Between Clemencia reef and Mangkap island are several sand ridges extending in a north-west and south-east direction and with shoal spots of 2 to 3 fathoms.

Between these ridges are depths of 6 to 12 fathoms, mud; as the currents are generally strong with overfalls, and there are no objects by which the position of a vessel may be accurately ascertained, it is advisable, as before mentioned, to pass southward of Fox shoal.

GELAM or Laag island is about 4 miles in extent, very low, wooded, and the largest of a group lying 10 miles north-westward of Sambar point. Penambung Tikus, a group of islets and sunken rocks, extend about 3 miles westward of Gelam island, being a continuation of the rocky and foul ground lying between Mangkap and Gelam. Langau and Peranton islets lie northward of them.

A reef, about 4 miles in extent, with a least depth of $1\frac{1}{2}$ fathoms, lies about 6 miles south-westward of Gelam.

BAUWAL or KUMPAL ISLAND, better known among the natives as pulo Bauwal, lies about 6 miles northward of Gelam island. It is 6 miles in length, by 4 miles in breadth, thickly wooded and low, with the exception of two small hills rising above the vegetation near the centre of the island.

This island was, in former times, the rendezvous for the China convoys in case of separation, and then known as Rendezvous island.

See chart, No. 2,160.

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Reefs extend about one mile from the north and west sides, and several islets and rocks lie upon the reef off the north extreme; upon the eastern side, banks of hard sand lie parallel with the coast, extending a mile from it, and are steep-to. Patches of sand and stone, both above and below water, are found within 2 miles of the south side of Bauwal island, and foul ground extends to the Peranton islets.

Corcyra bank, of 2 fathoms, lies S. by W. ½ W., about 5 miles from Sulphur point, with a patch of same depth nearly 2 miles within it. A patch of 3¾ fathoms lies South 3¾ miles from Corcyra.

The hill over Batu Jurang point, open westward of Bauwal island, leads westward of these dangers.

Anchorage.—Sheltered anchorage in both monsoons may be obtained off the east side of Bauwal or Kumpal island; it may be approached by a channel with depths of about 6 fathoms between Chempedak and Merah, the northern islet upon the reef extending from Bauwal island. Rocks above water extend about 4½ cables eastward of Batu Merah.

There is anchorage off the west side of Kumpal island, which has a sandy beach, in about 5 fathoms, with Sulphur point about S. ½ W., and the north extreme E. by N. ½ N., sheltered from easterly winds.*

Water may be obtained on the island by digging above high water mark.

Chempedek, a low wooded island lying 2 miles northward of Kumpal island, and 1½ miles westward of Batu Jurang, has a rocky coast line except on the south-east side where there is a sandy beach and a small village. The island should not be closed to a less distance than 6 cables upon the seaward side, as many detached dangers exist within that distance. There is a channel between Chempedak and the islands off Batu Jurang.

Batu Jurang is a high rocky point, whence a range of hills culminating in a conical peak 689 feet high, extends in a north-easterly direction, and forms the deep slopes of the southern shore

* *See* chart No. 2,160. There appears to be an eddy tide near the island, as Lieutenant Hoskyn states that the rising tide sets to the southward, where as in the offing it sets about N.N.W.

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of Kendawangan river, the range terminating about 7 miles from the sea. Two islets, the northern and smaller, named Tengating, and the southern, Iras, lies close off the point and are steep-to on their western side.

Between Batu Jurang and Kendawangan river, a depth of 7 fathoms water will be found at about 4 miles from the coast.

KENDAWANGAN RIVER is navigable for small steam vessels beyond the village of Kendawangan, situated 20 miles from the entrance and 4 miles eastward of mount Kedio. The village has a population of about 100 Malays. The entrance of the river can be distinguished from seaward at about 5 miles distant, and is obstructed by a bar having a depth of 11 feet at low water. Landing is bad in the north-westerly monsoon period.

Two rocks dry at low water, named Batu Bunja (Crocodile stone) lie about one mile from the south entrance point of the river, and just north of the fairway. From the south rock the east point of river bears E. by S. ½ S.

The three Kuting Jambu islets and many rocks lie off the north point of the river. Two miles westward of them there is anchorage in 4 fathoms, sand.

Directions.—Steer in with the south point of the river entrance bearing East, and when on the bar a more northerly course may be made for the middle of the river, where the channel between the banks extending from the entrance points is most distinguishable. It should not be attempted without local knowledge.

Tides.—The tide at springs rises about 5 feet, neaps 2½ feet.

Mount Kedio, 1,707 feet above the sea, is the summit of a range of hills extending in a south-westerly direction, westward of Kendawangan river.

Gasei point, at 6 miles northward of Kendawangan river, is high and rocky; reefs extend seaward about 3 cables, also in an S.S.E. direction for one mile. Northward of the point the coast is low and wooded as far as Minto point, and intersected with streams of fresh water.

Sawi island is low, 6 cables in extent, and situated 7 miles southward of Minto point, at 5 miles off shore. The tops of the trees are visible from a distance of 12 miles, and islets lie about 2 cables off its east and west points.

See chart, No. 2,160.

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Foul ground extends from Sawi island, half way to the shore, rendering the inshore channel intricate.

Onrust reef, dry about 2 feet at low water, and half a mile in extent, lies with Mengkudu rocks bearing N. $\frac{3}{4}$ E., and Sawi island S.E. by E. $\frac{1}{2}$ E., distant 6 miles.

Mengkudu or Gilbert rock, is 33 feet high, and sparsely covered with vegetation. Reefs extend from the rock in all directions, that on the south side for nearly half a mile, having from 5 to 9 fathoms close to the edges.

Minto mount and point.—Minto point is a narrow peninsula about $1\frac{1}{2}$ miles in length, with mount Minto, 328 feet in height, near its extreme, visible about 20 miles in clear weather.

A reef, nearly dry at low water, lies nearly 2 miles N.W. of Minto point.

Between Minto point and Ketapang river the ground is foul within the depth of 5 fathoms.

A bank of sand extends 2 miles off shore abreast Bereh village.

Pesaguan river.—The entrance to Pesaguan river is situated in a bight of the coast, where the shores are low and densely wooded, 13 miles northward of Minto point. The river is about half a cable wide, has a depth of 3 feet over the bar at low water, with from 2 to 3 fathoms water within.

PAWAN RIVER.—The Ketapang and Karbau rivers, 3 miles apart, are the two mouths of the Pawan river, and connect about 12 miles above their entrances. The Ketapang has a depth at low water of about $1\frac{1}{2}$ feet; springs rise about 3 feet.

The bank, dry in places, fronting the shore to the distance of 2 miles off them, is steep-to, the depth decreasing suddenly in places from 6 fathoms to one fathom, with a hard bottom. The bars are dangerous during the westerly monsoon.

Anchorage.—There is a fine weather anchorage for small craft in 3 fathoms, with Tanjong Beras Bassa S.S.E. $\frac{1}{4}$ E. and Karbau south point N.E. $\frac{1}{4}$ E.

Coast.—Northward of Pawan river to Chempedak island the coast is low and swampy, and is fronted by a mudbank with depths of less than 3 fathoms, to the distance of 3 or 4 miles. Chempedak, Sam-

See chart, No. 2,160.

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padian, and Kasaberas, are rocky islets with wooded summits, situated on the mudbank; the passages between them are obstructed by rocks.

Juanta island is a rocky and wooded island, having a conical peak visible about 25 miles in clear weather, useful in the navigation of the locality. Rocks above water lie between it and Katung islet, and also at $1\frac{1}{2}$ miles E. $\frac{3}{4}$ S. of it.

Katung islet lies one mile south-west from Juanta and has a reef lying half a mile north-west of it, which usually breaks.

SUKUDANA, lat. 1° 14′ S., lies on the east side of the large and shallow bay formed eastward of Maja island, upon the north shore of a small river artificially barred with stones; it is the principal village on this part of the coast. The Dutch Government have a small fort and garrison, but no supplies can be obtained for shipping.

The whole of this bay is shallow, with channels of slightly deeper water leading to those rivers; the 3-fathoms line fringing Maja island at the distance of 3 miles, stretches across the bay to about the same distance southward of Sukudana, but passing within half a mile of the point just southward of Batu islands, thence resuming its distance of 3 miles off shore.

The Batu islands are wooded and about 100 yards off shore at $1\frac{1}{2}$ miles southward of Sukudana.

The two hills lying north and south of Sukudana, and 1,752 feet and 1,590 feet high, respectively, are conspicuous objects, and may be seen from a distance of 32 to 36 miles in clear weather.

Anchorage.—Vessels may anchor off Sukudana in 3 fathoms, soft mud, at about $3\frac{1}{2}$ miles W. by S. of the flagstaff, but the ground swell render the anchorage an indifferent one. There is the same depth of water much nearer the shore, at about half a mile off the cliffy point, close south-eastward of the Batu islands, or about 2 miles south of Sukudana, where communication with the shore is easier.

Small craft find shelter from the south-east monsoon in about 9 feet, mud, just within Salahnama island, and near the south point of Sukudana bay.

Tides.—It is high water, full and change, at about 8h. 30m. in the morning during the north-west monsoon, and the same hour in the evening during the south-east monsoon. Tide rises 6 feet at springs.

Simpang river, lies at the head of the bight formed by Maja island, and the main coast to the south-eastward. Its mouth is

See chart, No. 2,160.

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obstructed by extensive mud flats; the best approach is near the eastern shore, close to the rocky islet Pelintuan, where there is a least depth of 4 feet.

Kumbang and Mendawa rivers.—The mouth of the channel known as Kumbang river, leading from the southward, between Maja island and the main, to Simpang Lida river, is 3 miles wide abreast Kumbang island on the east side of its entrance; it is fronted by a bar about 5 miles wide, composed of mud, over which a depth of about 11 feet may be carried at low water, with local knowledge. Within Turun point the depths increase to 5 and 7 fathoms, but above Paduan river it decreases to $3\frac{3}{4}$ fathoms.

At the north-east extreme of Maja island it connects with Maja river, and the united streams under the name of Simpang Lida river continue for 6 miles to the entrance of Mendawa river, and its junction with Padang Tikar. The Mendawa connects with Kapuas river. Vessels from 6 to 9 feet draught can navigate to Pontianak from the Kumbang river by these channels.

MAJA ISLAND fronts the Borneo coast north-eastward of Carimata island, and separates the Maja river from the Kumpang. It is about 26 miles in length, by about 18 miles in extreme breadth. Mount Maja on its western side is 1,738 feet in height, and mount Marang or Sanja peak near its south extreme is 196 feet high; the remainder of the island is low. Its south-west extreme is covered with tall casuarina trees, and fronted by a bank with 3 fathoms and less to the distance of 3 to 5 miles, increasing off the north-westward side of the island to about 7 miles.

Depths of less than 5 fathoms extend nearly 10 miles south-westward of the island, to within 3 miles of Meleidung island.

Maja river has a least depth of $2\frac{3}{4}$ fathoms on the bar situated abouf midway between Penebangan island and the north-west extreme of Maja island; within the bar it deepens to 4 to 7 fathoms, and connects with the Kumbang and Simpang Lida rivers at the north-east extreme of Maja island, as before mentioned.

To enter, steer for mount Maja bearing E. $\frac{3}{4}$ N. until Antu island is in line with the western Masien Tiega island, when steer N.E. over the bar; thence passing about $1\frac{1}{2}$ miles off the north-west extreme of Maja island, and northward of the bank which extends about

See chart, No. 2,160.

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3 miles north-eastward of that extreme; thence towards the narrow portion of the river, which is about half a mile wide bordered by shelving mudbanks. *See* remarks on the Kumbang, p. 497.

Antu, a small rocky island thickly wooded on the summit, lies just within the 3-fathoms line in the approach to Maja river; it forms a useful mark for vessels bound to that river, being visible in clear weather from a distance of 12 miles.

Masien Tiga islands, two thickly wooded islands situated north-north-west of Antu island, and 4 miles from the coast of Borneo, are visible 20 miles in clear weather. Nanas and Malang Merakat are small wooded islets lying one mile off shore, eastward of Masien Tiga islets. Vessels of less than 12 feet draught can cross the flat between Antu and Masien Tiga islands, keeping a lookout for snags which at times obstruct this passage.

Coast.—From Maja river northward to Padang Tikar the coast is low and fronted with extensive banks of sand and mud; vessels should not approach the coast nearer than 8 miles, or bring Penebangan summit southward of S. by E. $\frac{3}{4}$ E.

PADANG TIKAR RIVER, situated about 20 miles northward of Masien Tiga islands, is the deepest river on the west coast of Borneo, having a depth of $3\frac{3}{4}$ fathoms over the bar at low water over a breadth of one mile, and a depth of 3 fathoms over a breadth of 3 miles. Vessels of 12 feet draught can reach Pontianak from Padang Tikar by proceeding southward of Panjang island, and thence by Jenu and Mendawa rivers to the Great Kapuas, but local knowledge is necessary. Little Kubu river, on the east side of entrance to Padang Tikar, admits vessels of about 10 feet draught at high water.

Tides.—In the south-east monsoon it is high water at Padang Tikar river about 8h. 30m. P.M.; and in the north-west monsoon about the same time in the morning. The rise and fall of tide at springs is from 3 to 4 feet in the former, and about 6 feet in the latter. Off the coast the flood runs about S.S.E. and the ebb N.N.W.

Directions.—The high trees on Padang Tikar point may be seen from a distance of about 12 miles. Radak mount, an isolated table table top, about 12 miles north-eastward of Padang Tikar point, is

See chart, No. 2,160.

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visible about 22 miles, and will be seen about the same time as the point in clear weather.

In entering the river, steer for Padang Tikar point, bearing E. ½ S., which will lead over the bar in 3¾ fathoms water, the shoalest part being about 6 miles westward of the point. When Radak mount comes in line with Burung islet (the south-eastern islet on the north side of river), bearing N.E. by E. ¾ E., steer for it until Padang Tikar point bears S.E. by S.; when edge to the eastward to bring Radak mount in line with Terjun hill, (a low rocky hill with two conspicuous trees on its summit on north side of entrance to Radak river). These objects in line being steered for, lead in the fairway in from 6 to 7 fathoms, between Burung islet and the flat extending westward of Panjang island. When the west point of Little Kubu river bears N.N.W., anchor in about 7 fathoms on the leading mark.

Vessels of 10 feet can enter Little Kubu river under favourable circumstances at high water, by steering for the west point of entrance on the bearing of N.N.W.; the depth on the bar at high water being 9 feet in the south-easterly monsoon, 12 feet in the north-westerly monsoon, and 6 feet at low water.

Proceeding up the Padang Tikar, and having the point of that name bearing S.E. by S., steer to the eastward and south-eastward, at about half a mile from the south bank, in depths of 5 to 7 fathoms as far as the east end of Panjang island; above this local knowledge is necessary.

Coast.—From Padang Tikar river to Little Kapuas river, at about 40 miles to the northward, and on which is the settlement of Pontianak, the coast is low, marshy, and broken into several islands by the shallow streams forming the delta of Great Kapuas river, the principal of which is the Membawang with a depth of 6 feet at low water.

The Ambawang mountains situated about 14 miles northward of Padang Tikar river, rise from this low coast, and may be seen in clear weather from a distance of 36 miles, and are therefore visible from Pontianak road. The shore is fronted by a mud bank to the distance of 2 to 3 miles with depths of less than 3 fathoms, which may be approached by the lead. For Pontianak, *see* Vol. II.

DIRECTIONS.—Carimata strait from the southward.—Approaching Carimata strait from the southward, a vessel will have

See chart, No. 2,160.

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to depend principally upon the correctness of her reckoning, for the depths are so irregular that they will afford but imperfect guidance, and the land is too distant to be of service in determing her position. If to the westward of longitude 108° 20′ E., a good look-out should be kept to get sight of Kebatu or Shoe island (page 475), which, if seen, will determine the position; thence course may be shaped for the strait, either by the main route eastward or Discovery, Lavender, and Cirencester shoals; or by the route westward of those dangers, between them and the Osterly shoals, avoiding Bower shoal.

Should the vessel be to the eastward of 109° 30′ E., and approaching the parallel of 4° S., care must be observed to keep to the westward of the dangers which, including Hector bank, extend about 40 miles southward from Mangkap island, which island should on no account be sighted until it is known to bear eastward of N.E. Having passed Bauwal or Kumpal island, a course should be shaped to pass eastward of Ontario reef, dry at half tide, between which and Black rocks there are no known dangers; Carimata, Serutu, and the adjacent islands affording good objects for determining the position.

(Vessels may pass westward of Ontario reef, between it and Montaran islands; avoiding Flying Fish reef, which lies 13 miles southward of it, Condor reef of 2½ fathoms situated about 7 miles northward of those islands, and Florence Adelaide reef to the north-westward. The passage eastward of Ontario reef is to be preferred.)

Having brought Serutu island to bear East about 5 miles, course may be shaped as requisite, observing that Carimata peak kept eastward of S.E., or Serutu summit S.S.E. ½ E., leads westward of Gwalia reef and the reefs northward of it.

Vessels passing northward through Carimata strait during the months of December, January and February, (the strength of the north-west monsoon) generally keep near the coast of Borneo to avoid the strong southerly current; and pass into the China sea through Greig channel or Inner channels; directions, p. 501.

See remarks on pilots, page 468. China sea continued in Vol. II.

From the northward, in the north-west monsoon period, the channel eastward of Ontario reef should be taken. Approach Serutu island between the bearings of S.E. and S.E. by E., passing 4 or 5 miles westward of it, observing that the west extreme of the island kept westward of N. ½ W., leads eastward of Ontario reef. Thence the peak of that island may be gradually brought to bear N.W. by N.,

See chart, No. 2,160.

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astern, until lost sight of, which direction being preserved leads well to the eastward of Catherine reef. (If passing westward of Ontario reef, avoid Flying Fish and Condor reefs lying between it and Montaran islands.)

From a position 10 miles eastward of Catherine reef, a S.S.E. course should lead in the fairway, and about 1.5 miles eastward of Discovery East bank, clear of all dangers.

From the northward, when the south-east monsoon is strong, vessels get smoother water and less current in Greig and Inner channels.

In thick weather, and not certain of the position of the vessel, the best way is to borrow towards the Borneo coast, to get a sight of the land if circumstances admit, and take a new departure from Bauwal island, avoiding the shoals extending 30 miles southward of Mangkap island.

Inner and Greig channels. — Vessels working through Carimata strait have to take either the Inner channel, or Greig channel, eastward of Carimata islands, the main strait being impracticable on account of the strong adverse current. In these channels the sea is smoother and the current not so strong, it being wholly or in part overcome by the tidal stream and the indraught into the rivers on the west coast of Borneo; vessels also have the advantage of the change of wind at night and in the morning caused by the land breeze, and which often brings it several points more to the eastward in both monsoons.

These channels (pp. 489, 490) have a convenient depth for anchoring, and the bottom is soft mud. Notwithstanding, working through these channels is slow and tedious; as an instance, H.N.M. surveying vessel *Hydrograaf*, when employed there, had a vessel in sight eight days that was working through.

As before remarked, p. 467, the flood stream comes from both northward and southward on this coast, meeting off Sukudana, the ebb going in the contrary directions.

From the southward.—Being northward of the dangers off Mangkap island and of mount Minto, the Borneo coast may be approached to 9 or 8 fathoms water, and to 7 or 6 fathoms when nearing the Papan islands. The Black rocks and Vogelnest islands

See chart, No. 2,160.

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should not be approached nearer than one mile. A vessel may pass on either side of the Papan islands, observing that the water quickly shoals to 5 fathoms, at 3 miles north-eastward of Meleidung, the easternmost of the group. The western side is clear.

Between Krawang islets and the Papan islands the depths are 12 to 13 fathoms, decreasing pretty regularly towards the Borneo coast; and between Papan, and Gurong or Passage islands, there are 11 to 12 fathoms. North-eastward of the Gurong islands the depths decrease rather suddenly from 8 to 5 fathoms, but gradually under that depth. Greig channel is bold towards either shore with depths from 12 to 16 fathoms in the fairway.

Between Penebangan and Masien Tiga islands, the Borneo coast may be approached to 6 fathoms, but when northward of Masien Tiga do not bring it southward of S.E. or stand into less than 8 fathoms until off Padang Tikar river, northward of which the coast may be approached to within 4 miles.

A vessel may stand off to or westward of the Leman islands observing that those islands (in sight from aloft) kept southward of S.E. by S., leads eastward of Twilight reef, and of the reefs westward of it.

From the northward.—In the south-east monsoon, steam vessels from Pontianak or from that direction, make use of Greig channel, thence passing eastward of Meleidung island, and down the Borneo coast, distant about 10 miles. From abreast Bauwal or Kumpal island, a good departure may be taken to avoid the shoals southward of it, and a vessel will be well to windward.

With the chart now published the navigator will have more confidence, and may probably find it convenient at times to venture amongst some of the islets, but it must be borne in mind that in those channels the current is invariably stronger and more erratic.

See chart, No. 2,160.

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CHAPTER X.

OUTER ROUTE FROM BANKA STRAIT TO SINGAPORE.

VARIATION in 1896.

Linga island ... ... 2° 10′ East.

Vessels bound from Banka strait to Singapore seldom adopt the Outer route to the eastward of the islands of Linga and Bintang, most vessels preferring to proceed by Rhio strait; it however forms part of the main route into the China sea, and is, therefore, of importance.

The COAST of SUMATRA from Batakarang point (page 401) trends north-north-westward for about 67 miles to Tanjong Bong or Jabong. The entire coast is very low, covered with wood, but little known, and fronted by a mudbank that, within a depth of 5 fathoms, extends about 10 miles off shore. It may be approached to a depth of 5 fathoms water, except off Tanjong Bong, close to which there are in some places from 7 to 8 fathoms. Vessels bound to Berhala strait should keep about 8 miles off shore until Tanjong Bong bears West.

TUJUH* or Seven islands, lie in the north-east approach to Banka strait, and about 20 miles from the north coast of Banka island. They are high, wooded, uninhabited, and visible about 25 miles; there are several off-lying reefs. Coasters occasionally visit the islands for the purpose of obtaining wood and water; the water, which is bad and scarce, is procured on the west side of Katjangan, where there are wells.

Ju, the southernmost of the islands, is small, but rises to a height of 270 feet. Sato, the most western of the islands, is also small, 105 feet high, and lies about 4 miles north-west from Ju. Between these, are Meranti island, 112 feet high, and Lalang; and midway between Sato and Meranti there is a reef, with a depth of 20 feet, and 11 to 14 fathoms around it. The three southern islets have fringing

* *See* chart of Banka strait to Singapore, No. 2,757; also No. 2,597.

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reefs. Chebia, the largest island of the southern group, is about one mile in extent, 373 feet high, and surrounded by a reef which projects a little more than a mile from its east extreme.

Katjangan or Tujuh, the north-easternmost and largest of the Seven islands, is 3½ miles in length by half a mile in breadth, with several peaks, the highest of which is 526 feet above the level of the sea. It is surrounded by a reef, on which are some rocks above water. About 2¾ miles westward from its north-west extreme, is Tukonkembang, a small islet, 120 feet high, surrounded by a reef. About one mile westward from Tukonkembang, is North-west rock, above water, with a small fringing reef.

DOKAN ISLAND (Monale), 300 feet high, lies about 24 miles north-eastward of the Tujuh group; it is about three-quarters of a mile in extent, and surrounded by a reef, on which are a small islet and some rocks nearly one mile from its north-eastern extreme. The summit of this island is sharp when seen from the northward, but appears round when approaching from the eastward.

Mary rock.—Three reefs extend in a S. by E. direction from the south point of Dokan. Mary rock, the outer one, has a depth of 6 feet and is distant 1½ miles; the middle rock has 10 feet, and the inner one 5 feet, distant about three-quarters of a mile from the point. The depths around them are from 12 to 18 fathoms.

The channel between Tujuh and Dokan islands has depths of 12 to 16 fathoms.

TOLI ISLAND or pulo Laut, 250 feet high, lies 8 miles N.E. by E. ½ E. from Dokan island. It is small, and surrounded by a reef, which on the north-west side projects half a mile. The summit of this island when seen from the northward appears round, but sharp from the eastward.

The passage between Toli and Dokan appears to be free from danger, and the depths in it are from 12 to 18 fathoms.

Directions.—When passing between Banka and Tujuh islands, the latter should not be approached to less than 13 fathoms water, nor Banka island nearer than 5 miles, for its dangers are all about 3 miles in the offing, and some of them nearly awash. Near the Malan Hyu and Malan Doyang rocks the bottom is rocky, and the depths irregular.

See charts Nos. 2,757 and 2,597.

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Vessels keeping to the southward of Toli and Dokan islands, in order to cross over to Borneo, must take care to avoid Mary rock lying S.S.E. 2 miles from Dokan island, and also Vega reef and other dangers described at page 462.

Between the north coast of Banka and Tujuh, Dokan, and Toli islands the general depths are from 14 to 16 fathoms, but more to the eastward they increase to 18 and 20 fathoms.

Currents.—From October to March, during the north-west monsoon, the currents run with force to the south-east, and during the other months to the north-west. It has, however, occurred that vessels going to Banka in June and July have experienced strong southerly currents.

PULO SAYA* **(Taya)**, situated about 32 miles north-westward of Tujuh islands, is steep-to, of granite formation, covered with wood, uninhabited, and rises to a double peak 630 feet above the sea; the northern peak is about 60 feet less in elevation than the southern one, and both peaks are in line on a N. by E. and S. by W. bearing. Two sandy bays are formed in the bight between the hills, and there are two small islets off its north-east side. The Niamok islets lie about one mile northward of pulo Saya.

Water.—There is a spring of good water on the western side of Saya during the north-west monsoon or wet season, and a boat at high water can approach it to within 40 feet, but at low water rocks extend nearly a cable beyond the sand. The knowledge of this may be important to the mariner, as no similar facility for watering occurs between Banka and Rhio strait. In the dry season, from about June to August, the spring is at times virtually dry, though enough water is collected in mud holes to supply the Malays who camp here for fishing.

Castor bank is a ridge of coral and sand, extending about 14 miles north-north-eastward of pulo Saya, about one mile wide; the general depths are 8 to 10 fathoms, but on one part, 10 miles from pulo Saya, there is a ridge about one mile in extent, with only 5 fathoms, steep-to on its eastern side. The bank is famous for a red species of fish, called from their colour Ikan Merah.

Pulo Saya bearing S.W. ½ W., will lead one mile eastward of the shallow part of Castor bank, and bearing S.W. by S. the same distance

* *See* charts, No. 2,757 and 1,789.

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to the westward. Diang or Eung, the east point of Linga (which, with the hill over Gubang point to the westward of it, appears at a distance like two islands), bearing N.N.W., will lead about 4 miles north-eastward of Castor bank.

Alang Kalem or Ilchester bank is about 2½ miles in length, 1½ miles in breadth within a depth of 3 fathoms, and steep-to, with a least depth of one fathom on two heads, near its western side.

From the centre of the bank, Gubang hill bears N.W. ½ N., distant about 11 miles. Pulo Saya, bearing S. by W., leads nearly 3 miles eastward of the bank.

SINKEP ISLAND, pulo Penuba, and two islands to the westward, appear from a distance like one large island, being separated only by narrow channels. They lie off the south-western part of Linga, and, together with some adjoining islets and shoal spots, cover a space from 20 to 24 miles in extent.

Sinkep, the largest island of the group, is of irregular shape, and of considerable elevation, having on its eastern side a range of hills with a peak 1,732 feet high near the centre of the range.

It is only the east and north-east coasts of Sinkep and the dangers off it which will be noticed here; the other portions of the group belong to the Inner route, by Berhala and Durian straits, and are described at pp. 544, 545.

Dangers.—At 3¾ miles E. by S. from Mabang, the south-east point of Sinkep, is the south end of a shoal, which from thence extends N.N.E. for 5 miles with a breadth of 1½ miles. At each end is a patch of about 2½ fathoms, with depths of 4½ and 5 fathoms between. Buku, the south point of Sinkep, bearing West, leads one mile southward of this danger; and the eastern point of the island bearing North, leads about the same distance eastward.

Rocks and shallow water extend nearly one mile from the east point of Sinkep, and the soundings show a bank, with less than 5 fathoms, projecting 4 miles in a north-easterly direction from it. As no soundings have been taken near the north-east coast of Sinkep, it should be approached with caution. There are some rocks awash off the east sides of the small islets lying between the north-east point of Sinkep and Penuba island.

See charts, Nos 2,757 and 1,789.

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LINGA ISLAND, lying about midway between Banka and Singapore strait, is about 33 miles in extent, in a north-west and south-east direction, but excepting at the southern part where the town and road are situated the island has not been surveyed. Upon its southern part is Linga peak, a remarkable mountain, attaining an elevation of 3,921 feet, and split in two, which Horsburgh describes as "two peaks rising like spires from the summit of the mountain"; it is visible from a considerable distance in clear weather.

Tanjong Eung or Diang, the east extreme of Linga, from its prominent position and pyramidal peak, 750 feet high, is conspicuous, and visible in clear weather about 30 miles. Tanjong Ru, the south point of the island, may be known by a saddle hill, 630 feet high, near it. These points make like islands when above 13 miles distant.

Islets.—Rocks.—Pulo Merali is an islet lying three-quarters of a mile south-eastward of the hill on Diang or Eung point. Pulo Kaka, a larger islet lying about half a mile off shore in a south direction from the same hill, is surrounded by a reef which extends one mile off its south-west point. Between Eung point and Tanjong Ru is a deep bight named Tolo bay, on the east side of entrance to which is the small islet Diarum, with some rocks awash around it.

Pulo Singsa, a small islet, lying a little more than one mile south-eastward of Tanjong Ru, is surrounded by a reef, and a rock just above high water lies one mile off its south end; depths of 4 and 5 fathoms extend about one mile southward and south-westward of it. At 4½ miles W. by S. of pulo Singa is De Hes rock, with 6 feet water, 12 fathoms around it, and nearly 2 miles off shore. The south extreme of pulo Kaka open southward of pulo Singsa leads southward of it, and Linga peak N.W. by W. leads westward.

LINGA ROAD.—The bay forming Linga road is exposed to southerly and easterly winds, and large vessels are obliged to lie far out on account of shallow water extending from the mouth of the river, and around pulo Kolombo and its adjoining islets.

Islets.—Reefs.—Pulo Kolombo, the largest of these islets, lies nearly 2 miles southward from the entrance of the river. Anlo and Baang islets are both small, the former lying about one mile south-east, and the latter the same distance eastward from Kolombo. About 2 miles westward of Kolombo is pulo Bodas, almost connected by reefs to pulo Mapar, a larger islet about one mile to the northward,

See charts, Nos. 2,757 and 1,789.

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which has a grove of cocoa-nut trees; a village abreast contains about 300 Malays and Chinese, chiefly fishermen.

The following are the outermost of the dangers extending from the islets:—A shoal with 2 fathoms or less lies with pulo Bodas, distant $1\frac{1}{3}$ miles, and in line with pulo Mapar. Another shoal lies 2 miles S.S.E. from pulo Anlo, having $1\frac{1}{2}$ fathoms on it; Penuba peak, bearing W. $\frac{1}{2}$ N. leads half a mile southward of it, and nearly one mile southward of the shoal off pulo Bodas.

Linga.—The town of Linga or Dyak is prettily situated on the banks, and nearly one mile within the entrance of the freshwater river. The high rugged, fantastic peak of Linga in the background together with the rakish appearance of the country boats all moored to cocoa-nut trees and areca palms, their rich foliage almost obscuring the houses, give to the whole a picturesque appearance.

The river is not more than 100 feet wide, and will only admit small vessels, as its bar dries at low water springs. Both sides near the entrance are densely wooded, and alligators are numerous.

Population.—Trade.—The town contains about 6,000 inhabitants, Malays and Chinese. The former prefer their usual style of houses constructed on poles, but some of the Chinese have substantial buildings of stone. The produce is rattans, pepper, and gambier, which is carried to Singapore and Rhio principally by native craft. Gold is found in small quantities after heavy rains. Tin has not yet been found, but the neighbouring island of Sinkep produces some. The Sultan is nominally under Dutch protection.

For value of trade, *see* Rhio, p. 8. In the year 1894, 25 Singapore vessels entered, and 65 Netherlands India.

Water.—There is a well of good water on pulo Mapar, but the shore is bordered by a reef, which makes watering difficult except from half flood to half ebb. There is also a well near the town.

Anchorage.—There is anchorage in Linga road in 4 fathoms, mud, with pulo Bodas bearing N.N.E. about one mile, and Penuba peak W. $\frac{1}{2}$ S. There appears to be good anchorage eastward of the islets, in about 7 fathoms, and 4 miles off shore, with Linga peak just eastward of Kolombo, N.W. $\frac{3}{4}$ W., and the peak of Sinkep S.W. by W.

Tides.—It is high water, full and change, in Linga road at about 7 h.; springs rise 7 feet. The flood runs to the westward at the rate of 2 miles an hour.

See charts, Nos. 2,757 and 1,789.

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Directions.—A vessel proceeding towards Linga road from Banka strait should pass westward of pulo Saya, and steer for the high land to the eastward of Linga peak, giving the eastern coast of Sinkep a berth of at least 5 or 6 miles.

In working, by not bringing the east point of Sinkep to the eastward of North, will avoid the shoal off the east side of that island; and by not bringing the south-east point of the island to the southward of S.W. until Linga peak bears N.W. by N., will avoid the shoal bank which extends 4 miles in a north-easterly direction from the east point of Sinkep.

When standing towards the south coast of Linga, De Hes rock, which is steep-to, will be avoided, by keeping the south extreme of pulo Kaka open of pulo Singsa, or Linga peak northward of N.W. by W.

Bound to Linga road from the north-eastward, round the east point of Linga island at a moderate distance, and then steer to the westward for the anchorage.

COAST.—The North-east coast of Linga is formed of numerous hillocks, from 200 to 300 feet high, which gives it a uniform appearance; but neither it nor the adjacent islets are safe to approach at night, being as yet but imperfectly surveyed. The soundings obtained by H.M. surveying vessel *Saracen* in this locality were confined to those above a depth of 10 fathoms, as vessels can gain no advantage by keeping close in shore.

Islets and reefs.—East Domino or Selengtang, is an islet about 80 feet high, lying about 8 miles northward of Diang or Eung, the east point of Linga. A reef extends about half a mile north and south of the islet, and a rock awash (position doubtful) is said to exist about 3 miles south of it. The depths close eastward of the islet are 14 fathoms, increasing to 16 and 17 fathoms at the distance of 3 to 4 miles.

Domino hill or Bujang island, is about 2 miles in extent, with a peaked hill near its centre; it lies about 4 miles westward of East Domino.

Great Domino or Kongka island lies about 3½ miles northwest of Domino hill island; it is moderately elevated and about

See charts, No. 2,757 and 1,789.

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4 miles in length. Off its south-east point are two islets named Maras, and off its north-west point are two others, named Blaiding.

Crocodile rock, about 15 feet high, lies 4 miles north-eastward of Great Domino. A coral reef about three-quarters of a mile in length, 70 yards in breadth and awash at low water, is charted about 2 miles W. by S. from Crocodile rock.

Brisbane shoal, lies N.W. by W. $\frac{3}{4}$ W. $2\frac{1}{4}$ miles from Crocodile rock; it is composed of coarse sand, about one mile in extent, with 2 fathoms water, 6 to 7 fathoms close around, and depths of 6 to 8 fathoms between it and Crocodile rock.

Kintar island.—Three other islands with one or two adjacent islets extend from 4 to 8 miles in a north-westerly direction from Great Domino. The large island next northward of Great Domino, named Kintar, has on its south-east end a high bluff; when coming from the northward, and before the adjacent islands to the southward are visible, it much resembles the hill on the east end of Linga.

Rocks, with 3 feet water lie N.W., distant about 2 miles from pulo Kapas, a small islet surrounded by a reef, and the north-westernmost of the group extending from Kintar.

Fly bank, the position of which is doubtful, is a small patch of 2 fathoms, with 9 to 13 fathoms close-to, charted N.N.W. $\frac{1}{2}$ W. 10 miles from Crocodile rock, with the high bluff of Kintar bearing S. $\frac{5}{8}$ W., distant $7\frac{3}{4}$ miles.

Pollux rock, a doubtful patch of 2 fathoms, with 10 and 11 fathoms close-to, lies N.W. $\frac{1}{2}$ W. about $4\frac{1}{2}$ miles from Fly bank. Not shown on Dutch charts.

Merodong peak.—From 20 to 30 miles northward of Linga island are many small islands. The most conspicuous of them is pulo Rodong, or Merodong (lat. 0° 24′ N., long. 104° 27½′ E.), which has a high conical peak, 797 feet above the sea, the only hill of this feature in the vicinity. This peak is one of the principal objects which will enable a stranger to make out the entrance to Rhio strait; it may, however, occasionally be useful to vessels working to or from Singapore by the Outer route. (*See* also p. 519.)

See chart, No. 2,757.

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Frederick reef (lat. 0° 38′ N., long. 105° 10½′ E.) is the outermost of the reefs lying off the south east coast of pulo Bintang. It is nearly 3 cables in diameter with two heads near the centre awash at low water. The depths around are from 20 to 22 fathoms, except at the north-east side, where irregular depths of from 10 to 13 fathoms extend half a mile off. From the centre of the reef, pulo Merepas or Ruig island bears N.W. ¼ N., distant 23¼ miles.

In light winds the reef may be distinguished by the discolouration of the water, but with a fresh breeze it is difficult to distinguish breakers from the swell, except when the tidal stream is setting against the wind with a comparatively smooth sea. Off Bintang island at the change of the monsoon in April, the flood stream runs southward for 18 hours, and the ebb northward for 6 hours. In June the periods are reversed, consequently a stream against the wind (south-west monsoon) will only take place a few hours each day. (*See* tides, p. 515.)

From the close examination made by Mr. Stanton in H.M. surveying vessel *Saracen*, he was led to believe that the other reefs which were said to exist near Frederick reef, are identical with it, and that there are no other dangers in its vicinity.

Clearing marks.—As this dangerous reef lies in the direct track of vessels, the utmost care is necessary to avoid it. A vessel will keep eastward of it by not going into less than 25 fathoms; and to the westward of it by keeping Gin peak (a conspicuous hill, 337 feet high), Kwas hill (835 feet high on Bintang), and pulo Buruan, 308 feet, well in sight, until the latter bears W. by N. which leads well northward of the reef.

Sandbank.—At about 11 miles N.W. by W. ½ W. of Frederick reef, is the termination of a narrow sandbank with depths of 7 to 10 fathoms, and steep-to on its eastern side. From this extreme, the bank trends in a south-west and west direction for about 30 miles to Mesana island, entrance to Merodong strait. In the north-east monsoon much rain and thick weather are experienced, at which time, by obtaining soundings on this bank will afford a good guide to clear Frederick reef and Geldria banks, and will avoid anchoring in deep water.

EAST COAST of PULO BINTANG.—Numerous islands and dangers lie off the southern part of the east coast of Bintang,

See chart, No. 2,757.

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among which no vessel should venture. Vessels making the passage between Banka and Singapore straits should pass outside or to the eastward of the whole of these islands and dangers, and it is therefore only necessary here to notice the outermost of them. The whole coast, which is but imperfectly known, and the islands off it are as a rule fringed with coral.

Islands and reefs.—Pulo Gin or Great island, is the name given to three islands, which are together about 4 or 5 miles in extent, lying about 6 miles south-eastward of the south-east extreme of Bintang, and separated from each other by narrow channels. Several hills on the islands are from 200 to 300 feet high, and one, named Gin peak, rising about the centre of the south-eastern island, is 337 feet in height. (*See* also p. 525.)

Pulo Teroti, the southernmost of a cluster of islets, lying to the eastward of pulo Gin, is 112 feet high, and lies 2½ miles eastward from that island.

Pulo Buruan, is the northern of these islets, and lies 5 miles northward of Teroti. Being 308 feet high, and saddle-shaped, it is conspicuous and easily recognised.

Geldria banks are the outermost dangers, lying 13 or 14 miles eastward of pulo Gin, well out towards the fairway of vessels proceeding between Banka and Singapore straits, especially such as pass westward of Frederick reef. Their north-east extreme lies E. by N. ½ N. distant 15 miles from Gin peak, whence the banks extends in a south-west direction about 2½ miles; having rocky heads of 2 to 3 fathoms, 15 to 20 fathoms close-to the eastern side, and 7 to 12 fathoms, irregular depths, near the south-west and west sides.

Raleigh shoal lies 3 miles westward from the south-west extreme of the Geldria, and has 2 fathoms water over a coral bottom, with pulo Buruan bearing W. by N., distant 5 miles. Several patches of 4 fathoms lie northward and southward of it.

A patch, of coral and sand, nearly one mile in length and half a mile in breadth, with 2 fathoms water, lies 3 miles south-westward of Raleigh shoal, with the centre of pulo Buruan bearing N.W. ½ N. distant 4½ miles.

See chart, No. 2,757.

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Boat rocks (Kaju Ara), lying about 2½ miles north-west from the north end of Geldria banks, are three low rocks, visible about 4 miles. A rocky patch, with 3 fathoms water, lies about midway between.

Pulo Merapas or Ruig, is the outer and easternmost island off the east coast of Bintang. It is 115 feet high, covered with trees, and is steep-to at 3 cables off.

A coral bank, with depths of 3 to 5 fathoms, and about one mile in extent, lies S.W. by W. ½ W., 5¼ miles from pulo Merapas or Ruig. Pulo Buruan bearing S.S.W., leads eastward of it.

Clearing marks.—Pulo Teroti, bearing West, leads southward of Geldria banks and the other shoals; Boat rocks in line with pulo Buruan, leads northward, and pulo Merapas or Ruig N.N.W. ½ W., leads eastward of them.

PULO MAPOR or PANJANG, an irregular-shaped island from 3 to 4 miles in extent, lies about 8 miles off the east coast of pulo Bintang. Rocks extend about one mile off its north-east point; and there are others, some above water, off its south-east point, the outer ones of which, named Bare rocks, are 55 feet high.

Anchorage.—On the east side of the island the coral reef,—which as a rule fringes all the islands contiguous to the east coast of Bintang, as well as that coast itself,—is absent, leaving a small sandy bay, where vessels may anchor in 8 or 9 fathoms, about three-quarters of a mile off shore. As the bottom in parts of this bay is foul, care must be taken to keep the two Bare rocks open eastward of Tree islet 58 feet high, forming the southern extreme of the bay.

Water and wood may be procured in this bay, and boats can approach close to the beach at all hours of the tide,

Passage rock, 26 feet high, lies about three-quarters of a mile northward of the north-east point of Mapor or Panjang.

Pulo Sutu, or Volcanic island, 140 feet high, lies N.W. by N., distant 2 miles from the north-east point of pulo Mapor. It is steep-to on the north side, but a reef extends half a mile from its south extreme.

See chart, No. 2,757.

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Pulo Sutu, with Middle rock, Black rock, and pulo Berlang (Blanhap), lying north and north-west of pulo Mapor or Panjang, form a sort of chain stretching from outside the dangers off the north coast of that island to the shore of Bintang, and to the southward of which no vessel should attempt to pass.

Middle rock is a pinnacle, awash at low water, and 11 fathoms close to, lying N.N.W. 2½ miles from the north-west point of pulo Mapor, and nearly 4 miles from pulo Sutu. Black rock bearing W. by N., or pulo Sutu S.E. by E. leads northward of it.

Black rock, 22 feet high, with a smaller rock close to its south side, and depths of 13 to 17 fathoms around, lies 6 miles north-westward of pulo Sutu.

Pulo Berlang (Blanhap) is a small island 90 feet high, lying 5 miles westward from Black rock, and nearly 2 miles from Tanjong Berlang, on the north-east coast of Bintang.

COAST.—Landmarks.—From Tanjong Berlang (Blanhap) to Tanjong Berakit or Brakit, 8 miles north-westward, the north-east coast of Bintang forms a bay indented with several bights. Over the point at about one mile north-west of Tanjong Berlang is a conspicuous tree, the top of which is about 250 feet above the sea, and 2 miles within is a hill, 420 feet high. Three-quarters of a mile northward of this hill, close to the coast, is another, named Double Tree hill, 334 feet high.

The shore of this part of Bintang is for the most part fronted by a reef which projects in some places to the distance of half a mile; and just to the northward of the point, upon which stands the conspicuous tree, is a ledge of rocks, between which and the point north-westward of it, is Boat cove, apparently a convenient place for landing.

Water.—Several small streams of fresh water discharge themselves near the middle of this bay, but the watering place appears to be about one mile northward of Boat cove.

Soundings.—From Black rock, which is steep-to to pulo Kuku a small island lying close to the eastern face of Tanjong Brakit, and which may be approached to half a mile, the soundings shoal gradually, and the lead is a good guide. (For coast to the westward *see* page 230.)

See chart, No. 2,757.

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Tides and tidal streams.—It is high water, full and change, at Tanjong Brakit, the north-east point of Bintang, at 11h. 0m. p.m.; at pulo Sutu at 3h. 40m.; at pulo Mapor or Panjang at 4h. 20m.; at pulo Buruan at 6h. 0m.; the spring rise is about 9 feet, but on extraordinary occasions it may be as much as 12 feet.

During the shifting months of the monsoons the tidal streams are regular, but during their strength the surface current will be always more or less governed by the wind.

The flood tidal wave comes from the northward, and runs nearly parallel to the east coast of Bintang, along its southern side towards Abang strait, and to the northward in Rhio strait, meeting another flood stream from Singapore strait, near the town of Rhio.

The flood sets to the southward along the east coast of Linga, and close to Tanjong Eung, its south-eastern extreme; from thence it runs westward to Penuba strait and obliquely across Linga bay to Berhala or Varella strait. From Tanjong Eung to pulo Saya, and onwards to Banka strait, its direction is nearly South; another stream from about 2 miles southward of Saya sets towards Berhala strait. *See* remarks on Frederick reef (tides), p. 511.

The ebb stream sets in the opposite direction, and the meeting of this stream from Banka and Berhala strait was observed to take place between pulo Saya and Tujuh islands.

Winds.—Near and during the period of change from the south-east monsoon to the north-west monsoon, sailing vessels may be five and six weeks in making the passage from Singapore to Banka strait. In the month of September H.M. surveying vessel *Saracen* had the south-east monsoon strong, with much rain; about the equinox there were several heavy squalls. This monsoon is generally supposed to shift about the beginning of October, but during the whole of this month the wind was only four hours from the northward, there being a succession of calms, light southerly airs, a close muggy atmosphere surcharged with electricity, and frequent heavy Sumatra squalls or south-westers. On the 9th of November the monsoon shifted with furious gusts.

These squalls at this season generally take place at night, accompanied with heavy rain, thunder, and lightning, and are of short duration. *See* rainy season, pp. 12–16.

See chart, No. 2,757.

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DIRECTIONS by the Outer route from Banka strait to Singapore.*—The ordinary route for sailing vessels bound northward from Banka strait is between the Tujuh islands and pulo Saya; they may, however, pass on either side of pulo Saya, which, being high and bold, is very convenient to make in thick weather or at night.

At night, or in thick weather, the lead may be very useful in detecting the drift caused by cross currents between the Tujuh islands and Sumatra, for the depth decreases generally towards Sumatra, and increases towards those islands; but care should be taken in approaching them, as the remarkable irregularities of the currents have brought many vessels into the danger of being entangled among them. Near Sumatra a mud bottom mixed with sand prevails, and near the islands mud only.

Castor bank, lying north-eastward of pulo Saya, has not less than 5 fathoms water, but a vessel will pass eastward of it by keeping pulo Saya westward of S.W. ½ W., and will pass westward, between it and Ilchester bank, by keeping pulo Saya between the bearings of S.S.W. ½ W. and S. by W., until pulo Merali bears westward of North. By keeping the east point of Linga (which, with a point to the westward of it, appears at a distance like two islands) bearing N.N.W. will lead from 3 to 4 miles north-eastward of Castor bank and Ilchester shoal.

Having passed eastward of pulo Saya, a course may be steered to cross the equator in 20 or 21 fathoms, or in about long. 105° 30′ E. From the equator, steer about North until past Frederick reef and Geldria banks, observing in the night not to come under 23 or 24 fathoms between lat. 0° 30′ N. and 0° 50′ N. to avoid those dangers; if it be day when pulo Merapas or Ruig is seen, keep it westward of N.W., and it will lead eastward of those dangers. When abreast of pulo Mapor (Panjang), and in depths of 24 or 25 fathoms, a N.W. or N.W. by W. course, according to tide, will lead to the entrance of Singapore strait. (*See* directions for South channel to Singapore, p. 243, &c.)

See chart, No. 2,757.

* Continued from p. 425.

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CHAPTER XI.

RHIO STRAIT.

VARIATION IN 1896.

Rhio strait ... ... 2° 15′ East.

RHIO STRAIT.—General description.—The route from Banka strait to Singapore, eastward of Linga and through Rhio strait, is the one commonly adopted by vessels proceeding either way between Sunda strait and Singapore, for the reasons stated at page 39, that Rhio strait is safe, sheltered, and easily navigable, the Netherlands Government having placed lights and beacons on many of the dangers; whereas the route eastward of Bintang is exposed in both monsoons, and the fairway is encumbered with many dangers, which render it necessary for vessels to keep at a considerable distance from the land.*

It is available for all classes of vessels.

This route is particularly convenient for sailing vessels leaving Singapore for Europe in the north-east monsoon, and but few adopt any other. By proceeding through Rhio strait they avoid the delay and inconvenience so frequently experienced during that season in getting to sea by the main channel of Singapore strait, eastward of Horsburgh lighthouse. In the south-west monsoon also, vessels are frequently able to proceed to the southward much quicker by this route than by the outer one.

Rhio strait, the southern limit of which is between Mesana and Talang islands, is bounded on the east by Bintang island, and on the west by the chain of islands of which Batam, Rempang, and Galang are the chief; numerous smaller islands and shoals front the main shores on each side of the strait, and very much contract the width of its main navigable channel. The strait is about 50 miles in length, in a north-west and south-east direction, having depths ranging from 6 to 20 fathoms in the fairway, the least depths being in the southern portion of the strait. Better water than 6 fathoms could be carried, for which, *see* the chart.

* *See* chart of Rhio strait No. 2,413.

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The southern entrance of the strait is about 15 miles wide, for a distance of 11 or 12 miles; it then contracts to about 9 miles between pulo Siulung and Great Karas island. About the middle of the strait, and 3 miles northward of Karas island, is Pankel island, surrounded by a reef extending in some places half a mile off shore, to the westward of which is the principal channel, about 3 miles wide, bounded on the west by the islets and banks off the north-east end of pulo Galang. The principal dangers are buoyed or beaconed.

At pulo Lobam, about 10 miles northward of Pankel, the strait is reduced to about 2 miles in width between Johannes shoal and Orion rock, the narrowest part of the strait.

Northward of West point, the western extreme of Bintang, the strait rapidly widens to its northern entrance, where it is about 10 miles in breadth.

WEST SIDE OF RHIO STRAIT.

ISLANDS AND REEFS.—Mesana island, at the southern entrance of the strait, is peculiar in shape, consisting of two narrow ranges of moderately elevated hills at right angles to each other; the longer range extends from the south point of the island 4 miles in a northerly direction, whence the shorter trends 2 miles eastward.

The shore reef extends in places to the distance of half a mile from the north shore of Mesana, and an isolated patch of 2 fathoms lies 6 cables off. A cluster of rocks above water lies 2 or 3 cables westward of Observation point, the north-west point of the island, westward and south-westward of which other dangers extend more than half a mile. On the east side of Mesana, the shore reef extends off nearly three-quarters of a mile, and embraces the small wooded islet off the east point.

Niamok, a small square shaped island, with a reef projecting one mile in a north-easterly direction from it, lies one mile south-eastward of Mesana, and between them are several rocky islets and reefs.

Anchorage.—The bay on the east side of Mesana appears to afford good anchorage in from 5½ to 8 fathoms, by not bringing the

See chart, No. 2,413.

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eastern part of the wooded islet off Mesana to the eastward of N.E. ½ E., nor the eastern side of Niamok to the eastward of S. by E. ¾ E.

Merodong peak, on the south-east end of Merodong island, is 797 feet high, and lies 4 miles westward of Mesana. This peak seen from the southward presents a conical appearance, and being the only hill of this feature in the vicinity is conspicuous. It is one of the principal objects which will enable a stranger to identify the entrance to Rhio strait, for it can nearly at all times be seen over Mesana as the strait is approached. The hill, from the peak, forms a shoulder to the north-westward, and gradually slopes in that direction, so that after Mesana is passed the conical shape disappears. *See* also p. 510.

Mesana and Merodong islands form the south side of Merodong strait.

Binan island, 3 miles north-westward from Mesana, is 2 miles in length, narrow at both ends, and widening to half a mile near the middle. The island is easily recognised by a conspicuous hill, 269 feet high, at the south-east end. A reef fronts the greater part of Binan, extending from a quarter to half a mile off the north and north-west sides.

Rifleman shoal, situated about a mile off the centre of Binan, is a patch of hard sand 3 cables in extent, the least water being 2 fathoms; from this spot Binan hill bears S.W. ¼ S., distant 1¼ miles.

Katang Linga island, 1½ miles north-west from Binan, is a bold, bluff looking island, 246 feet high, nearly one mile in length and half a mile in breadth; a reef fronts the greater part of it, extending in some places about 2 cables. A shoal, with 4 feet water, lies three-quarters of a mile W.S.W. from the north point of Katang Linga, but it is quite out of the track of vessels navigating Rhio strait.

Binan and Katang Linga form the eastern limit of a number of islands named the Titampan group (*see* page 552).

Selanga islands, three in number, are small, but elevated and conspicuous; they lie 3 miles westward of Katang Linga. Vessels working, should not stand to the southward of a line joining Katang Linga and North Selanga.

See chart, No. 2,413.

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Udik is an islet lying 3¾ miles west-north-westward from North Selanga; both these lie out of the direct track of vessels, but those working through should not stand to the southward of a line drawn between north Selanga and Udik, in order to avoid a rock awash which lies W. ¼ N., distant 2 miles from Selanga.

Pulo Rondo or Dempu, 129 feet high, lies about 8 miles north-westward from Katang Linga, and about 1½ miles south-eastward of the south end of pulo Galang. It is a remarkable little island, showing very round and bold against the adjacent land, and is one of the most useful objects for recognizing the entrance to the strait when coming from the southward. Haai reef (p. 555), a patch of 2 fathoms, lies a quarter of a mile to the southward of it; and there is a rock above water about 3 cables to the north-westward.

Great bank, is situated within the edge of the 5-fathoms line fronting the bight between the south-east extreme of pulo Galang and East Selatan island. The bank is 1½ miles in length, with a least depth of 2¼ fathoms, and affords temporary anchorage on and within it for vessels of light draught.

East bank lies one-third of a mile S.E. ½ E. of Dempu point, the outer point of the islands eastward of Selatan. It is little more than half a mile in extent, with from 4 to 9 feet water, and 8 to 9 fathoms close-to.

Tjassens shoal, between Tarong island and Great Karas island, is about 3½ miles in length, one mile in breadth, and with from 4 to 18 feet water; a reef which uncovers at half ebb is situated on its south-east extreme.

There is a channel on each side of Tjassens shoal, but the northern one is narrow at the western end, having a general depth of 3½ fathoms, and is only available for small vessels: the southern channel is nowhere less than three-quarters of a mile wide, with depth of 6 to 13 fathoms. Care is necessary, however, when avoiding Tjassens shoal, to give a safe berth to a small reef which lies one-third of a mile off the north-east part of Tarong island; and when the west end of Great Karas bears N.E., steer to pass midway between the west extreme of that island and Stone islet, to avoid the reefs situated on the bank fronting pulo Galang.

See chart, No. 2,418

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Little Karas island marks the south-west end of the narrow part of Rhio strait; it is a quarter of a mile in length east and west, formed of two small hills, and fringed by a narrow reef.

Dittlof reef, lies about three-quarters of a mile S. by E. from the eastern extreme of Little Karas, and uncovers. A 3-fathom patch, steep-to, lies about a quarter of a mile South of it; and between Dittlof and Little Karas island there is a patch of 2 fathoms.

LIGHT.—On the eastern hill of Little Karas, from an iron framework painted white, is exhibited at an elevation of 121 feet above the sea, a *fixed white* light visible between the bearings of S. 56° E., through south and west, and N. 33° E., from a distance of 14 miles.

Great Karas island, situated half a mile westward of Little Karas, is 3 miles in length, by three-quarters of a mile in breadth; it has a flat summit, and a reef encircling it extending in places a quarter of a mile.

A patch which dries, lies about two-thirds of a mile N.N.E. ½ E. from the north-west point of the island; from the same point and extending nearly half-way along the north coast of the island is a bank, of 2 to 3 fathoms, projecting nearly one mile from the shore, and for half a mile farther in the same direction the depths are under 5 fathoms; vessels when abreast it, should keep the whole of Little Karas well open of Great Karas.

Tarong point, the north-east extreme of Galang island, lies 2½ miles north-westward from the west end of Great Karas, and has on its northern side a small bay, in which there is a village. A reef fronts the point to a distance of a quarter of a mile.

Mubut islands.—At 6 miles north-west from Little Karas, is East Mubut, 114 feet high, the larger and higher of the two Mubut islands, easily distinguished by its prominent position off the deep inlets to the westward. It rises to a round peak, with the greatest declivity on the eastern side; whilst the smaller island, West Mubut, is considerably lower towards its centre.

A reef, with less than 3 fathoms extends 1½ miles to the southward of Mubut, which will be avoided by keeping the west extreme of Great Karas bearing westward of S. by W. A reef also

See chart, No. 2,413

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extends 1½ miles northward of both islands; the north and east extremes of Sembulang point in line, bearing N.W. ½ W., leads close eastward of it.

Tiung strait, the opening between pulo Galang and pulo Rempang is blocked by a sandbank at about half a mile westward of West Mubut, having general depths of 6 to 12 feet; reefs also lie from 3 to 7 cables northward of Tarong point.

Sembulang point, the eastern extreme of pulo Rempang is the next prominent object on the western side of the main channel; the hill within it is 252 feet high. The point is fronted by a reef to the distance of about 2 cables, close to which are depths of 5 to 8 fathoms. A detached reef lies 4 cables off the north shore of pulo Rempang, and S.S.W. of Chemara bank; the water in the bight westward of it is shallow.

A patch of 4¾ fathoms lies about $1\frac{6}{10}$ miles off Sembulang point, with the eastern point of East Mubut S. 13° E., distant $2\frac{9}{10}$ miles.

Chemara bank, lying about 3½ miles north-westward of Sembulang point, and about 1¼ miles eastward of Chemara island, is one mile in extent, with a least depth of 1½ fathoms.

A **white buoy** is moored on the eastern side of this bank.

Chemara island is the southernmost of the chain of islands which front Salat Bulang between pulo Batam and pulo Rempang; it is 341 feet high, about 1½ miles in length, three-quarters of a mile in breadth, and surrounded at a short distance by a reef. Between it and Chemara bank the depths are 3½ to 5 fathoms.

Chemara kechil, lying about one mile northward of Chemara island, is about one-third of a mile in extent, and surrounded by a reef which on the east side projects a quarter of a mile; a ridge with rocky patches connects these islands, and a patch of 3 fathoms lies N.E. distant 4 cables from the north-east point of Chemara island.

Pulo Kantyil and Ayer Radya islands.—Pulo Kantyil lies westward of Chemara kechil; Ayer Radya lies close to the north-westward of Kantyil, and is the northernmost of four islands lying between Chemara island and Salat Bulang. Antu is a small round island with a rock above water close off its north-east point, lying close to the north-east point of Ayer Radya. They both stand on the reef which surrounds Ayer Radya.

See chart, No. 2,413.

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Johannes shoal.—On the edge of the 3-fathoms contour, fronting the bay between the eastern extreme of pulo Kantyil and Antu, lies Johannes shoal, a 2-fathoms patch with 7 fathoms close outside. Sembulang point kept open eastward of Chemara kechil leads eastward of Johannes shoal, and of the reef extending from Antu.

Orion rock, p. 532, lies abreast and north-east of Johannes shoal, between which is the narrowest portion of the fairway.

Nginang or Innang reef is a small reef lying on the north side of the entrance to Salat Bulang, and nearly three-quarters of a mile from the south-east side of pulo Nginang, with pulo Antu bearing S. by W. ¾ W. distant 1¼ miles. Patches of 4¾ and 5 fathoms lie about 3 cables south-west and north-east of the reef. Sau lighthouse, bearing N. by W., leads eastward of Nginang reef.

Pulo Nginang or Innang, situated 1½ miles north of Ayer Radya, with Salat Bulang between, is about 2½ miles in length, and 1½ miles in breadth. A reef extends southward and eastward of the island to the distance of one-third of a mile.

Shoal.—A small shoal with a depth of 4 fathoms lies with pulo Sau lighthouse N. 45° W., distant 1 4/10 miles. Sau lighthouse bearing N.N.W. leads between Nginang reef and the patch of 4 fathoms, or West point bearing North leads eastward of these dangers.

Pulo Sau lies close northward of Nginang, and has a lighthouse on its eastern extreme. Southward of this point a reef of coral and sand fronts the shore to the distance of 2 to 3 cables, its southern portion forming the north side of the narrow channel between Sau and Nginang. A detached rocky patch lies S.E., a quarter of a mile from Sau lighthouse.

LIGHT.—From an iron framework 36 feet high, painted white, erected on the east point of Sau island, is exhibited, at an elevation of 108 feet above high water, a *fixed white* light; it is visible in clear weather from a distance of 14 miles, between the bearings of S. 30° E., through south, and N. 30° E.

Pulo Nginang kechil lies on the north-east part of the reef which surrounds pulo Sau. A bank with 2 to 2½ fathoms water extends about half a mile N.W. by N. from Nginang kechil; and another, half a mile in extent, with 2¾ fathoms, lies a quarter of a mile beyond, in the same direction.

See chart, No. 2,413.

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Van Gogh islet, surrounded by a reef which extends south-westward nearly half a mile, lies half a mile north of pulo Sau. About half a mile N.N.W. of this islet is a coral reef with less than 6 feet water; its northern edge of 3 fathoms lies with the north point of pulo Sau bearing S. by E. ½ E. distant 2 miles.

Clearing mark.—Sau lighthouse in line with or open of the east point of Nginang kechil leads eastward of all these dangers; and Malang Jarong (an islet, off the eastern shore,) bearing E. by S., leads northward. The depths decrease rather quickly under a depth of 10 fathoms near the dangers just described, and in the event of a vessel standing towards the southernmost of them getting a cast of 10 fathoms or less, she should tack immediately.

Malang Orang.—The north-east coast of Batam, from abreast pulo Sau to Tanjong Nongsa or Burong, the western point of the north entrance to Rhio strait, is fronted by a reef, extending in some places to the distance of three-quarters of a mile. Malang Orang, an isolated reef, half a mile in extent, with 5 to 8 fathoms close-to, lies with Tanjong Malang Orang bearing W.N.W. distant about 7 cables.

A white buoy marks the eastern edge of this reef.

A rocky patch of small extent with a depth of 4 fathoms lies with Batu Besar N. 36° W., distant $2\frac{3}{10}$ miles.

Pan reef, lying in the northern entrance of Rhio strait, at 2⅓ miles E.N.E. of Tanjong Malang Orang, is visible at low water, when it appears as a ridge of black stones; the reef is 6 cables in length, and 2 cables in breadth, with depths of 5 to 7 fathoms close-to.

Beacons.—A large screw pile beacon is erected on the north-east end of this reef, and a black buoy is moored off the south-west extreme of the reef, 7 cables from the beacon.

Pas-op, or Little Pan reef, lying N.W. by W., distant 2½ miles from Pan reef beacon, and 1¼ miles off shore, is a coral patch, dry at low water, with depths of 3½ to 7 fathoms close around it.

A white buoy marks the north-west extremity of this reef.

Channels.—There is a safe passage on either side of Pan reef; that on the west side between the reef and the Batam coast, although not so wide as the eastern or main passage, is more convenient for

See chart, No. 2,413.

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sailing vessels anchoring in case of meeting with light baffling winds and contrary tidal streams; the depths being from 6 to 10 fathoms. Native pilots seldom use the eastern channel, where the depths are much greater.

Seamen will find no difficulty in proceeding by either channel, aided by the chart. The depths in the eastern channel are too irregular to admit of any useful description here, but the screw pile beacon on the Pan reef will always point out the position of that danger in time to give it a proper berth, even if the buoy moored off the south end should get adrift.

Clearing marks.—Sau lighthouse in line with the east extreme of Nginang kechil, bearing S. ¾ E., is a good mark for passing between Pan and Little Pan reefs; Tanjong Sau (on Batam) in sight also leads eastward of Little Pan reef. Sau lighthouse bearing S. ½ W., or Barbukit hill (on the Malay peninsula), bearing N. ¼ W., leads eastward of both the Pan reefs; and when pulo Nongsa is open of Tanjong Nongsa, a vessel will be northward of them, and in Singapore strait.

EAST SIDE OF RHIO STRAIT.

ISLANDS AND REEFS.—Pulo Talang, or Abu, the south-west point of which forms the south-eastern limit of Rhio strait, is irregularly shaped, nearly 5 miles in length, north-east and south-west, and about one mile in breadth. It may be known by a square hillock on its south end, 350 feet high, which, with a sharper peak westward of it, forms a saddle; the land from this to the western end of the island is nearly of the same elevation.

A reef fringes the west shore of the island to the distance of about 2 cables, with depths of 6 to 7 fathoms close-to.

Pulo Gin, or Great island (*see* page 512) lies 2 miles eastward of the northern part of Talang, and is one of the prominent objects marking the south entrance of Rhio strait.

Hendrik Jan rock is a small but dangerous pinnacle, with a depth of 2 fathoms, having 9 to 10 fathoms close-to.* It lies S.E. by S. distant 8 cables from the south-eastern point of Talang, with the summit of South-west hill in line with the south-west extreme of Talang. A patch of 4½ fathoms lies about 3 cables W. by N. of it.

See chart, No. 2,413.

* Originally stated to be nearly awash, but 12 feet was the least water found by Mr. T. H. Tizard, Master R.N., Surveying schooner *Saracen*, in 1866.

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Caution.—Several other shallow patches were found in the channel between Talang and Gin; but they all, except the Hendrick Jan, lie out of the ordinary track of vessels, and are dangerous only in the event of this channel being mistaken in thick weather for the entrance of Rhio strait. Vessels should give these islands a berth of 2 miles in passing, aud not bring pulo Teroti eastward of E. by N., until South-west hill comes well open of Talang.

Pulo Siulung or Mantang island, abont 8 miles in length, in an east and west direction, and 1½ miles in breadth, lies north-westward of Talang, and is separated from it by a channel about 1½ miles wide. On its south-west end is South-west hill, 267 feet high, which makes from the southward as a double-peaked hill. The west side of the island is foul to the distance of about 2 cables.

A narrow channel divides pulo Siulung at 4½ miles eastward of South-west hill.

At 4½ miles eastward of South-west hill is Siulung hill, with a table summit. It rises abruptly on its north side to an elevation of 507 feet, and terminates southward in a bluff point, close to which is Segai islet, which is lower than the adjacent land.

At a distance of 12 miles to the southward, both Siulung and South-west hills, owing to the land between them being low, appear as islands.

Thomas shoal.—Between South-west and Siulung hills is a bay about one mile deep, fronted by a fringe of reef and a shallow bank extending in places nearly three-quarters of a mile; upon this bank lie detached patches of reef. Thomas shoal, a patch 4 cables in extent, with a depth of 2 fathoms, lies W.S.W. nearly one mile from Segai islet.

Anchorage.—There is good anchorage between Thomas shoal and South-west hill, in 6 to 10 fathoms, with shelter from northerly winds; vessels should not stand into a less depth than 5 fathoms, as within that depth the bottom becomes irregular and shallow.

Siulung channels.—There are channels on either side of Siulung leading into the China sea, northward of pulo Gin; but as they are quite out of the ordinary track of vessels they should not be attempted by any one not locally acquainted. The southern

See chart, No. 2,413.

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channel, between Siulung and Talang, is about 1½ miles wide, with depths varying from 14 to 24 fathoms in mid-channel, and from 5 to 9 fathoms near the shore on either side. Some reefs lie at the eastern end of the channel, rendering it somewhat intricate.

The northern channel, between Siulung and the coast of Bintang, has several islands and reefs lying along and extending in places 2½ miles from the Siulung shore. The western of these reefs and islands are named Alligator and Blading reefs, and vessels should not pass eastward of a line drawn from them to Alligator island.

Two reefs lie on the northern side of the channel, the westernmost of which Prins reef, is one mile distant from Tanjong Batu Babi. The entrance to the channel is between the eastern reef and Blading island, and is 1¾ miles wide, with depths of 4 to 5 fathoms. Eastward of the two reefs and Tanjong Batu Lichin, the shore of Bintang is free from danger, and vessels may anchor at any convenient distance from it, in 12 to 18 fathoms. At the eastern end of the channel are several islands and reefs, which render it, like the channel southward of Siulung, somewhat intricate.

The tidal streams in Siulung channels run with considerable strength, and there are numerous overfalls.

Alligator island, 101 feet high, three-quarters of a mile in length, and a quarter of a mile in breath, lies 2 miles westward from South-west hill.

A rocky patch, nearly awash, lies 2 cables north-east of Alligator island; and another patch, having 1¼ fathoms, lies one-third of a mile eastward of the south point of that island.

Alligator reef, dry at low water, lies one mile N. by W. of Alligator island, and is a quarter of a mile in extent, with depths of 4 and 5 fathoms close-to.

Blading island, lying 1¼ miles northward of Alligator reef, is small and surrounded by a reef which extends in a southerly direction more than a quarter of a mile.

Eastward of Alligator reef and Blading island are several other reefs and islands, lying off the northern shore of Siulung.

Prins reef, lying 2 miles N. by W. ½ W. from Blading, is awash at low water, about a third of a mile in extent, and forms with that island the western entrance of the channel between Siulung and the

See chart, No. 2,413.

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coast of Bintang. It lies on the outer edge of the shallow bank which fronts Tanjong Batu Babi and the shore of pulo Dompa, and is the westernmost of the two reefs before mentioned as lying off the Bintang shore; the other, which is also awash, and about the same size, lies one mile east-south-eastward of Prins reef, with a bank of $1\frac{1}{2}$ to 3 fathoms water, extending one mile in an easterly direction from it.

The Topies are a cluster of round islets and rocks, on coral ledges, lying from 2 to 3 miles westward of Alligator reef. When approached from the southward these islets as they rise above the horizon present very much the appearance of the topies, or hats, in use among the Malays, hence their name. The northern and eastern islands are the largest of the group, the former (Topie island) is 134 feet, and the latter 118 feet high.

Reefs.—Beacon.—The small coral reef lying half a mile N.N.W. of Topie island is marked by a beacon. A bank half a mile in length, with $2\frac{3}{4}$ fathoms water, lies with its outer edge bearing S.E. by S., distant three-quarters of a mile from the eastern Topie.

A narrow bank with 4 to 5 fathoms water extends about $2\frac{1}{2}$ miles in a southerly direction from Topie island, with from $5\frac{1}{2}$ to 6 fathoms on either side; less water may exist.

Rotterdam reef is a rocky patch of $1\frac{1}{2}$ fathoms, lying with Topie island bearing E. by N. $\frac{1}{2}$ N., distant 7 cables.

A white buoy is moored on the west side of the reef.

A shoal composed of sand and stones, with a depth of 11 feet, lies with the north extreme of Topie island bearing E. by S., distant 2 miles.

A black buoy is moored on the eastern side of it.

Dutch shoal, a quarter of a mile in extent with 3 fathoms least water, and 6 or 7 fathoms close to its western side, lies with the south extreme of pulo Pankel N.W. $\frac{3}{4}$ W., distant $1\frac{1}{2}$ miles.

The three last mentioned dangers are situated on a bank $4\frac{1}{2}$ miles in length in a north-west and south-east direction, about $1\frac{1}{2}$ miles in breadth, with depths under 5 fathoms.

See **chart, No. 2,413.**

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Clearing mark.—A good mark to clear the western edge of this bank, is the summit of pulo Lobam open of the west extreme of Pankel.

Rupels reef is about 2 cables in extent, and marked by a beacon. It lies with the north extreme of pulo Pankel bearing N.W. distant 1½ miles.

Pulo Pankel or Pangkil, about 2 miles in length north and south, and half a mile in breadth, lies on the eastern side of the main channel of Rhio strait, abreast of Great Karas and Mubut islands, and from a distance appears as two round hills. It is surrounded by a reef which extends from a quarter to half a mile from the shore.

Beyond the reef at the north-west part of the island, a bank with less than 3 fathoms water projects to a distance of three-quarters of a mile. Eastward of this bank, and half a mile northward of the island, lies Pankel reef, a patch of rocks about a quarter of a mile in diameter, with less than 6 feet water on them.

Suri island and reefs.—Suri island lying north-eastward about 1½ miles from Pankel, is a small round island, covered with cocoa-nut trees, and surrounded by a reef to the distance of half a mile in places. A bank with 2 to 5 fathoms water extends about 1½ miles in a S.S.E. direction from it.

At 1¼ miles N.N.W. from Suri island lies a reef, nearly awash in places, one-third of a mile in diameter, with depths of 5 to 8 fathoms in the passage between. About one mile north-west from this detached reef lies the south-east end of the largest of the Suri reefs; it is a narrow strip of sand and coral about 1¼ miles in length, nearly awash, and surrounded by a bank with 2 to 3 fathoms water, and 5 to 7 fathoms close-to.

Buoyage.—A black buoy marks the north-east edge of a small 3-fathom patch, lying with the east extreme of Suri island bearing W. by N. ¾ N. distant about 5 cables; a patch of 4¾ fathoms lies 4 cables eastward of it, in the fairway of the channel to Rhio. A beacon marks the south-east extreme of Suri reefs, with the island bearing S.S.E. ½ E. distant 2¼ miles; and a white buoy lies off the north-west extreme of the reefs in about 5 fathoms, at 1½ miles N.W. of the beacon.

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Pulo Dompa is 4 miles in length, east and west, 1¾ miles in breadth, and separated from the west coast of Bintang by a narrow channel only available for boats. Its western extreme lies 2 miles north-eastward of Suri island.

The small islands, Basing and Sekatap lie off the south shore of Dompa; these, as also Dompa, are bordered by reefs which extend about 3 cables. Patches of less than 3 fathoms extend one mile south-eastward of Basing island, eastward of which the water is shallow.

From Basing island, a bank with 1½ to 3 fathoms near its edge, and 9 to 13 fathoms at a short distance, extends in a northerly direction, trending about one-third of a mile westward of Dompa, and thence to pulo Penjengat.

Buoyage.—A white buoy marks the edge of the bank between Basing island and pulo Dompa, and a beacon the west extreme of the reef off Tanjong Dompa.

The navigable channel between Dompa and Suri island reef is about 7 cables wide, and used by vessels bound to Rhio from the southward.

RHIO ISLAND is about 4½ miles in length east and west, 2¼ miles in breadth, and being separated from the mainland of Bintang only by a narrow channel, appears to form part of it. The town, which stands on the north-west points of the island, was formerly a port with much trade; and although its importance has for many years declined, is still a place of considerable traffic for small vessels. There are two landing piers, and a fort stands on a hill 70 feet high, commanding the town.

The Dutch Resident, for Bintang and other islands, has his head-quarters at Rhio.

Trade.—*See* value, p. 8. In the year 1894, 316 vessels belonging to Netherlands India and 200 to Singapore, entered.

Supplies.—Coal.—A small quantity of coal is kept at Rhio by the Netherlands Government. The mail steamers running between Singapore and Batavia call at Rhio, fortnightly.

A beacon, a white stone pyramid, 162 feet above the sea, stands on the coast at about 2 cables northward of Tanjong Pinang, about one mile southward of the town of Rhio.

Paku reef, lying about half a mile off the western shore of Rhio island, is about half a mile in extent, with a rock near its centre.

See chart, No. 2,413.

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There is a narrow channel between the reef and the coast, having 1½ fathoms water.

Pulo Penjengat, one mile westward of Rhio town, is about one mile in length, a third of a mile in breadth, and surrounded by a reef to the distance of a quarter of a mile.

Pulo Sengarang, about 5 miles in length by 2½ miles in breadth, is separated from Rhio island by a channel about 3 cables in breadth. The western extreme of this island projects some 3 miles to the north-westward of Rhio, affording shelter to small craft anchored off the town. There is a large Chinese village on the southern part of Sengarang, opposite to the town of Rhio.

Los is a small island lying close to the west end of Sengarang.

Anchorage.—The usual anchorage off Rhio is in 3 to 4 fathoms, about 2 miles northward of pulo Dompa.

The depths decrease gradually to 4 and 3½ fathoms, but shoal suddenly under a depth of 3 fathoms.

Most of the native craft anchor between pulo Penjengat and the town, entering by the narrow channel between Paku reef and the coast southward of Rhio, which is marked by three stake beacons with triangles, to be left on the port hand; the entrance northward of Penjengat is barred by a flat with 3 to 6 feet water.

Tides.—It is high water, full and change, at Rhio, at 9h. 50m.; springs rise 7 feet, neaps 5 feet.

Directions for approaching Rhio are given at page 541.

TERKOLEI ISLAND, situated 6 miles westward of the town of Rhio, is low, flat, about half a mile in extent, with a clump of trees on its east end; it is surrounded by a reef which in places extends nearly half a mile. The island stands near the middle of a shallow bank with from 3 feet to 3 fathoms water, composed of hard sand and mud, and 8 miles in length in an east and west direction. The eastern part of this bank extends to within half a mile of the reef surrounding Penjengat; and its western part to within half a mile of Lobam with several patches of 3 feet.

Buoy.—A black buoy lies in about 3 fathoms on the southern edge of this shallow bank, with the east point of Terkolei bearing N.N.W., distant one mile.

See chart, No. 2,413.

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Clearing mark.—The south extreme of Penjengat bearing East, leads southward of the south-east tail of the bank; and the summit of pulo Lobam bearing N.W. by W. $\frac{3}{4}$ W. leads southward of the whole of the bank.

LIGHT.—On the west end of Terkolei stands an iron framework, painted white and 42 feet in height, from which is exhibited, at an elevation of 46 feet above high water, a *fixed white* light visible in clear weather from a distance of 12 miles.

Isabella shoal, situated three-quarters of a mile southward of pulo Lobam, is 7 cables in length, east and west, 2 cables in breadth, and has from one to 2 fathoms water. A spit with $3\frac{1}{2}$ to 4 fathoms water stretches from its eastern extreme nearly one mile in an E.S.E. direction. The depths at a short distance from the south side of the bank are from 6 to 10 fathoms, but its western edge is steep, there being 11 fathoms close-to.

Buoys.—Black buoys in about 3 fathoms, and about 8 cables apart, mark the east and west extremes of Isabella shoal.

Clearing marks.—Terkolei lighthouse bearing E. $\frac{1}{2}$ N. leads to the southward, and Sau lighthouse in line with or open of the west end of Lobam kechil, leads well to the westward of Isabella shoal.

PULO LOBAM, situated about half a mile off the south-west part of Bintang, is a group of four or five small islands of about 2 miles in extent, separated by channels so narrow that they appear as one island. The two peaks on the large island attain a height of 342 and 268 feet, and with pulo Lobam kechil, the western islet, make from the northward as three peaks. A reef, which is steep-to, surrounds the group, and extends in places to the distance of one-third of a mile.

Reefs.—A reef, dry at low water, lies 2 cables south of the south-west point of pulo Lobam, and a reef with 2 fathoms lies half a mile westward of the north point of Lobam.

Orion rock, situated on the east side of the fairway, westward of pulo Lobam, is about 33 yards in extent, with a least depth of 16 feet, and 6 to 8 fathoms close around. It lies with the western point of pulo Lobam kechil bearing E. $\frac{3}{4}$ N., distant $3\frac{3}{4}$ cables.

See chart, No. 2,413.

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Buoy.—A black buoy placed in 3 fathoms water marks the west side of Orion rock.

A patch of $2\frac{3}{4}$ fathoms lies about 2 cables off the reef fringing pulo Lobam kechil, and W. $\frac{1}{4}$ N. distant $3\frac{3}{4}$ cables from the north end of that island. A rock awash lies midway between this patch and the fringing reef.

Clearing marks.—Sau lighthouse bearing northward of N.N.W. leads westward, and the south-east extreme of the Lobam group E. by N. leads southward of Orion rock.

Dessa islet and reefs.—Dessa, situated half a mile south-west of Tanjong Batu, on the southern side of a shoal three-quarters of a mile in extent, is a small islet, with one or more trees upon it. Two patches of reef, together nearly a mile in length, lie with their western extreme about 2 cables southward of Dessa, and between these and the reef with 2 fathoms water off Lobam there are charted depths of $4\frac{1}{4}$ to 9 fathoms. A rocky patch lies 3 cables off the north-west side of Dessa, and the same distance off-shore.

These dangers are steep-to. Lobam kechil bearing S.S.E., or Bintang West point bearing eastward of North, leads westward of them.

Pulo Bua, about three-quarters of a mile in length, fronts the bay between Batu and West points, and with the exception of a round lump which rises in its centre is lower than the adjacent land ; there is a remarkable white rock near its west side.

The island is bordered by a reef to the distance of about $1\frac{1}{2}$ cables ; two patches lie at that distance, south and south-east of the south point. The latter is a rock awash, and lies nearly in the middle of the channel between the island and the Bintang coast. At 3 cables northward of the reef fringing the north part of Bua, and 2 cables from the Bintang coast, is a 3-fathoms patch.

WEST POINT (of Bintang) lies nearly abreast the lighthouse on pulo Sau, on the opposite side of the main strait, and distant about 2 miles. The point is moderately elevated land, presenting a round shelving appearance, and from it the coast line trends north-eastward, forming the eastern side of the north entrance of Rhio strait ; the point is bold-to on the south and west sides, but on the north a reef commences, which abreast Senggera rocks extends 3 cables off shore.

See chart, No. 2,413.

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The Senggera is a ledge of flat rocks, lying 2 cables off shore, at 1½ miles northward from West point. The reef fronting the shore extends one cable outside them, and at low water dry heads of rocks will be seen extending nearly as far as West point.

Malang Jarong is a small islet, covered with trees, lying half a mile northward of Senggera rocks, on the edge of the reef fronting the shore, which here extends 4 cables off.

Pulo Dua is a small island, about 80 feet high, lying 2 miles north-eastward of Malang Jarong and close off Tanjong Kalumpang.

The reef which fronts the coast from West point extends a quarter of a mile outside Dua; thence to the eastward it blocks the whole of the large bight between Dua and Tanjong Sebong.

A bank, with 1½ to 3 fathoms, and one spot having less than one fathom water, fronts the shore reef north of Malang Jarong, the 3-fathom line which marks its edge trends from that islet in a north-east direction for 2 miles, and passes about half a mile outside pulo Dua; from thence it trends just outside the Pap and a group of rocks eastward of it, with an irregular outline to Tanjong Sebong. This bank between Malang Jarong and Dua is steep-to, and must be given a good berth.

Netscher shoal, the outer part of which lies half a mile outside the bank just described, is about half a mile in extent, composed of hard sand and coral, and has a patch of less than one fathom on its north-west edge. From this shoal spot the west extreme of pulo Dua bears S. by W. ¼ W., distant 1½ miles. Close to the western side of this danger there are depths of 6 to 10 fathoms.

Crocodile shoal, a small patch of hard sand, with 3 fathoms water, and 4½ to 8 fathoms around it, lies N.E. ½ N. distant 2½ miles from Netscher shoal, and with Tanjong Sebong north extreme bearing E. ¾ N., distant 2⅓ miles.

A **rocky patch**, one-third of mile in length, east and west, with a least depth of 1¼ fathoms on the western end, lies three-quarters of a mile south-westward of Crocodile shoal, with Outer rock bearing S. by E. ½ E. distant 9½ cables from the shallow part.

About a quarter mile southward of it there is a patch of 4 fathoms.

See chart, No. 2,413.

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Clearing marks.—Pulo Dua bearing S. by W., leads westward of the Crocodile, and of the rocky patch of 1¼ fathoms; and the northern extreme of Tanjong Sebong, bearing E. ½ S. leads northward of Crocodile rock.

Sau lighthouse bearing S.S.W. ¼ W., leads westward of all the dangers northward of Malang Jarong.

SEBONG BAY, 6 miles wide, between pulo Dua and Tanjong Sebong, is nearly filled up with reefs which extend 2½ miles from the shore of the south-east part of the bay, where the Sungi Sebong Besar enters it; there are also several outlying rocks above water in the bay.

Rocks.—Outer rock, the farthest off shore of the rocks in Sebong bay, is about 10 feet high, and situated with pulo Dua bearing S.W. by S. distant 2½ miles.

The Pap, a rock which dries 6 feet, lies three-quarters of a mile southward of it, just inside the 3-fathom line of the shore bank.

An isolated rock, about 6 feet high, lies E. by S. ¼ S. half a mile from Outer rock; and at half a mile beyond in the same direction is a small group of rocks above water, close off the reef fronting the shore.

Tanjong Sebong is the north-west extreme of Bintang and the north-eastern limit of Rhio strait. A small islet lies off the pitch of the point, and S.W. by W. one-third of a mile from this islet is a sunken rock. Some islets also lie close to the coast south-eastward of Tanjong Sebong.

Anchorage.—There is safe anchorage in Sebong bay, in 4 fathoms sand and mud, at about one mile E.N.E. of Outer rock.

TIDES.—It is high water at Tanjong Sebong about 1h. 50m. before Rhio, or at 8 hours. *See* also p. 531.

Tidal streams.—The tidal wave in the China sea comes from the northward, and, being divided by the island of Bintang, sweeps round its shores and flows into Rhio strait at both ends, the stream from Singapore strait at the northern end meeting that from the southward in the space between Chemara island and Rhio. In the northern entrance, on the western side, a portion of the flood stream entering the strait is deflected between Malang Orang and Pan reefs, and runs to the north-westward with the flood to

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Singapore, or in the reverse direction to the flood stream entering the main passage of Rhio strait; the ebb takes the reverse direction circling southward of Pan reef, where it joins the main stream ebbing north-eastward. This must be guarded against when near Pan reefs.

The main body of the southern stream takes a general westerly direction for Dempu strait, much of it diverging to the southward through the channels dividing the several groups of islands lying between Mesana and Dempu, and a portion turning off to the north-west, in the direction of Karas: this last is joined by the streams flowing through the Siulung and adjacent channels, which gradually trend away to the north-westward after they enter Rhio strait.

The monsoons and currents of the China sea very much affect the regularity of the streams, which are strong, and at the springs rush with considerable velocity through the channels among the islands, forming numerous eddies, and stirring up the mud. In the narrow northern part of Rhio strait, about West point, this is particularly the case, the stream running from 3 to 4 knots, and sometimes even 4½ and 5 knots.

BUOYAGE.—The buoys in Rhio strait are all conical and surmounted by staff and globe. Approaching Rhio from either entrance to the strait, white buoys mark the starboard hand and black buoys the port hand; like all other floating marks they are liable to be adrift or out of position, so that too much dependence must not be placed in them.

DIRECTIONS.—From the southward.*—For steam vessels Rhio strait offers no difficulties, and no directions are necessary beyond keeping in the main fairway; the following directions apply chiefly to sailing vessels:—A vessel intending to proceed through Rhio strait should, from a position about 12 or 13 miles north-eastward of Tanjong Diang, the eastern extreme of Linga island, steer about N.W. ½ N.; which if care be taken to guard against the effects of the tidal stream (particularly the ebb, which sets strongly to the eastward), will take her to the fairway of the entrance to Rhio strait, and midway between Merodong and Gin peaks, which are visible in clear weather from a considerable distance.

In this track, if the course be duly preserved, the vessel will pass about 8 miles outside Crocodile rock, and 6 or 7 miles outside Pollux rock, which should not be approached under a depth of 12 fathoms,

See chart, No. 2,413.

* Continued from page 516.

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and will have soundings of 15 to 13 fathoms, until abreast that rock, when the depths will increase to 18 to 20 fathoms.

These depths will continue for 7 or 8 miles, when they will suddenly decrease to 12 or 10 fathoms, on the sandbank which trends north-eastward from Mesana island, right across the approach to the strait. The depths upon this part of the bank appear to be irregular, and it would seem that a vessel might get a cast of 19 or 20 fathoms when crossing it. After she is fairly over the bank the depths will increase to 14 or 15 fathoms, and continue so for 3 or 4 miles, when they will again become irregular, varying from 10 to 18 fathoms, until abreast of pulo Gin.

(At night or in thick weather, a vessel, from a position about 13 miles north-east of Tanjong Diang, should steer a N.N.W. ½ W. course for about 25 miles, and then N.W. ½ W. for about 30 miles, which, if proper allowance has been made for the tidal stream, will keep her about 11 miles eastward of Pollux shoal, and place her in the fairway of the entrance to Rhio strait, with pulo Gin on the starboard beam.)

Some difficulty has at times times experienced by strangers in making out the entrance to Rhio strait, on account of the numerous islands in its vicinity. The high conical peak of Merodong (*see* page 519) should be made out as soon as possible, that being the first conspicuous object on approaching the strait, and if this can be discerned no difficulty will be found in making out the other points as the vessel proceeds.

Pulo Dempu, the small round island on the west side of entrance of the strait, with Table hill on pulo Galang, South-west hill on Siulung, pulo Talang, and pulo Gin, with a flat peak near its centre, will, at a distance of 14 miles, readily show the approach to the strait; whilst, at a nearer distance, Little Karas lighthouse, the Topies, Alligator, and other islands, cannot fail to point out its entrance.

Having brought the south end of pulo Gin abeam, shape course for Little Karas island lighthouse, which should be passed about one mile distant, to avoid the Rotterdam and Topie reefs to the eastward.

From abreast Little Karas, shape course through the fairway, to pass about one mile westward of pulo Lobam, a distance of 17 miles; observing that the east end of East Lumut bearing S. ½ E. or southward of that bearing, until the north extreme of Sembulang point bears southward of W. by S., leads eastward of the 4¾-fathoms patch near the fairway.

See chart, No. 2,413.

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Then, to avoid Orion rock, the south-east end of pulo Lobam group should not be brought to bear eastward of E. by N. until Sau lighthouse bears N.N.W., or West point bears North, which will lead in the fairway westward of the rock. Thence with West point bearing North, until abreast the south end of pulo Bua, to pass midway between it and the patch of 4 fathoms off pulo Sau; then alter course to pass a half or three-quarters of a mile westward of West point, from abreast which steer to pass eastward of Pan reef beacon.

The mark for passing eastward of Pan reef, is Sau lighthouse bearing S. ½ W., or Barbukit hill on the Malay peninsula, westward of North. A vessel will be clear of the Pan reefs when pulo Nongsa opens of Nongsa point, and may then shape course as necessary for Singapore road. If the stream be setting to the westward a sailing vessel should be careful, especially in light or contrary winds, to get well over on the northern side of Singapore strait; otherwise she may be carried to the westward of St. John's islands, unable either to fetch into Singapore road, or, from the great depth of water, to anchor.

The channel westward of Pan reef is used by the pilots in preference to the channel eastward of it (*see* page 524, and tidal streams at page 535). Sau lighthouse in line with the east extreme of Nginang Ketchil S. ¾ E. leads through nearly in mid-channel between the reefs. For directions to Singapore, *see* page 243 and preceding pages.

Working through Rhio strait from the southward.—It seldom happens that a vessel will have to work along near the islands from Mesana to Dempu point; it is generally found advantageous to stand to the northward, in case of meeting with a north-westerly wind. But it may occasionally happen that a vessel will derive advantage by standing towards them; in which case, when standing towards the north side of Mesana, avoid bringing the summit of Binan northward of W. by N. To clear Rifleman shoal, lying 1¼ miles eastward of Binan, the eastern extreme of Mesana must not be brought eastward of S.E. ½ E., or the northern extreme of Katang Linga northward of W. by N. ½ N. This last bearing also clears the 3½ to 4 fathoms bank off the north part of Binan. Katang Linga may be approached to the distance of half a mile. The Selanga islands and Udik may be approached to within a moderate distance, but vessels should not stand within a line drawn

See chart, No. 2,413.

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from the north extreme of Katang Linga to the north Selanga, nor within another drawn from the last-named island to Udik.

Standing to the westward, towards the south end of pulo Galang, a vessel may approach Great bank and East bank to a depth of 10 fathoms. Pulo Dempu bearing S.W. by S. leads southward of these banks, and is a safe turning mark.

Between Dempu point and Little Karas a vessel may stand into 8 or 7 fathoms; but to avoid Dittlof reef, Chirum point, the eastern point of Galang, must not be brought to bear southward of W. ½ S. until Little Karas lighthouse bears westward of N.W. Little Karas should not be approached nearer than a quarter of a mile, nor Great Karas than half a mile, to avoid their reefs.

Between Great Karas and East Mubut island, a vessel may stand into 8 or 7 fathoms; Little Karas well open of Great Karas is a good turning point to avoid the bank off Great Karas; Lobam kechil open of East Mubut island clears the bank extending southward of East Mubut.

After passing East Mubut, its eastern extreme must not be brought eastward of S. by E. ½ E., until the southern extreme of Sembulang point bears W. by N. ½ N., to clear the bank which extends north-west of East Mubut; thence to avoid the 4¾-fathoms patch off Sembulang point, keep the east end of East Mubut southward of S. ½ E. until the north extreme of Sembulang point is southward of W. by S.

The bay between Sembulang point and Chemara bank is apparently free from danger, and a vessel may stand in until Lobam kechil bears N. by W.; to avoid Chemara bank, keep West Mubut just open of Sembulang point.

Chemara kechil should not be approached nearer than half a mile, as the fringing reef is steep-to. After passing this island, Sembulang point should be kept open of it, to avoid Johannes shoal and the reef extending from pulo Antu.

To avoid Nginang reef, keep Sau lighthouse well open of pulo Nginang; and to clear the reef fringing that island, keep the north-east point of Nginang kechil open of the eastern extreme of pulo Sau; this will lead clear of the reefs and westward of the 4-fathoms patch, as far as the eastern extreme of Sau, which should not be approached nearer than half a mile on account of the small reef lying a quarter of a mile south-east of the lighthouse. West point bearing North, leads eastward of the 4-fathoms patch.

See **chart, No. 2,413.**

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After passing Nginang kechil, in standing to the westward, keep pulo Sau lighthouse open eastward of Nginang kechil; this will lead clear of Van Gogh island shoals and of the 4-fathoms patch off Malang Orang.

Tanjong Sau, kept westward of S.W. ½ W., leads southward of Pan reef; Barbukit hill kept westward of North, or Sau lighthouse westward of S. ½ W., until Johor hill bears N.N.W. ½ W. leads eastward of that danger; and pulo Nongsa open of Tanjong Burong or Nongsa point leads northward of it.*

In working between the Pan reefs, keep Tanjong Sau well open of Tanjong Malang Orang, or the eastern extreme of Nginang kechil southward of S. by E., in order to avoid the reef extending about 6 cables from the Batam shore.

Standing to the eastward, towards pulo Talang, at the southern entrance of Rhio strait, be careful to give the south-eastern side of that island a berth of 2 miles, and to keep South-west hill, on Siulung island, well open of Talang, to avoid Hendrik Jan rock. The south-west point of Siulung and Alligator island may be approached to half a mile. When nearing the Topies, South-west hill kept well open of the southern point of Alligator island will lead southward of those dangers and of Rotterdam reef, in about 4½ fathoms of water; the south-western extreme of pulo Pankel kept northward of N.W. ½ N. leads westward of Rotterdam and Dutch shoals.

To clear the bank of 4 to 5 fathoms, extending 2½ miles southward of the Topies, Siulung hill must be kept open of South-west hill, until the summit of pulo Lobam is open westward of pulo Pankel.

The south-west end of Pankel should not be approached nearer than half a mile, as its reef is steep-to; the west side may be neared to 7 or 8 fathoms, but off its northern end keep Little Karas lighthouse open of pulo Pankel, to avoid the shallow water extending N.N.W. from it.

Between pulo Pankel and Isabella shoal, a vessel may stand to the eastward into 8 or 9 fathoms; but should not bring the north-east extreme of Pankel to the southward of S.S.E., or Terkolei lighthouse to the westward of N. by W., to avoid Suri reefs. Terkolei lighthouse bearing E. ½ N. leads southward of Isabella shoal; and

See charts, Nos. 2,413 and 2,403.

* Barbukit hill may be recognised by the low land adjoining it, whilst Johor hill terminates abruptly to the westward.

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the south-east extreme of pulo Lobam group bearing northward of E. by N. until Sau lighthouse bears northward of N.N.W., leads southward and westward of Orion rock.

When northward of Orion rock, the western extreme of Lobam kechil should not be brought southward of S. by E. $\frac{3}{4}$ E., until Tanjong Batu bears East, which will avoid the dangers near Dessa island. Tanjong Batu is steep-to; and both it and pulo Bua may be approached to about 3 cables, except near the extremes of that island. West point is bold, but the shore northward of it, to Malang Jarong, must not be approached nearer than half a mile.

Northward of Malang Jarong there are depths of 7 and 8 fathoms close to the edge of the shallow bank which fronts this part of the coast to the distance of nearly one mile. This bank and also Netscher and Crocodile shoals and the shoal between them will be avoided by keeping Sau lighthouse southward of S.S.W. $\frac{1}{4}$ W. If Sau lighthouse cannot be made out after pulo Dua bears southward of East, Malang Jarong island—which will be seen well clear of the extreme of the land as Netscher shoal is neared—must not be brought westward of S. by W. $\frac{3}{4}$ W., until Pan reef beacon bears W.S.W., or Tanjong Sebong north extreme E. $\frac{1}{2}$ S.; a vessel will then be northward of those dangers and in Singapore strait.

Through Rhio strait from Singapore.—Vessels leaving Singapore at high water, or about the first quarter of the ebb, and taking about 4 hours to reach the entrance of Rhio strait, will probably carry a fair tidal stream through both straits; but no dependence can be placed on it. (*See* tides and tidal streams, pp. 239 and 535.)

The flagstaff on fort Canning, Singapore, bearing West, leads 2 miles southward of Johore shoal; and when Johore hill bears North, a vessel will be eastward of the shoal. Entering Rhio strait, pass between Little Pan reef buoy and the screw pile beacon on Great Pan; or, in a vessel of heavy draught, pass eastward of the Pan reef beacon, with Barbukit hill bearing just westward of North.

The directions previously given for coming from the southward, if reversed, will suffice for proceeding southward.

To Rhio anchorage from the southward.—Vessels bound to the anchorage off Rhio, having entered the strait, *see* page 537, should steer for the Topies till within about 3 miles of them; then course should be shaped to pass between the buoys marking Rotterdam reef

See chart, No. 2,413.

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and the reef 1½ miles north-westward of it. (There is also a good channel, unbuoyed, between the Topies and Alligator island, close westward of the latter.) Thence between the buoy south-west of pulo Dompa and the buoy marking the reef eastward of Suri island, avoiding the patch of 4¾ fathoms eastward of the latter; and when the whole of Los island is open westward of pulo Penjengat, steer for it, to the anchorage described on p. 531.

The chanuel southward and eastward of Paku reef is beaconed and available for small craft with local knowledge.

To Rhio anchorage from the northward.—Having entered Rhio strait, as directed at page 536, and reached a position southward of Orion rock, a south-easterly course should be steered, keeping Sau lighthouse open of Lobam kechil until Terkolei lighthouse bears E. ½ N., to pass southward of Isabella shoal; thence steer midway between Terkolei and Suri reef buoys, to the anchorage in the road.

See chart, No. 2,413.

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CHAPTER XII.

BERHALA AND DURIAN STRAITS.

VARIATION IN 1896.

Durian islands - - 1° 20′ East.

General remarks.—Sailing vessels bound from Banka strait to Singapore during the strength of the north-east monsoon frequently adopt the Inner route by Berhala and Durian straits During the prevalence of strong northerly winds in the months of December and January they will save much time by doing so,* for here they will have smooth water, good anchorage, and but little tidal stream, whereas on the eastern side of Linga at this season of the year, there is generally a heavy sea, and a southerly current sometimes running at the rate of 3 knots an hour. In Berhala strait they will also be greatly assisted by the squalls from the Sumatra coast.

Berhala strait is situated at the southern part of this route, and Durian strait at its northern part; the intermediate portion has not received a specific denomination. The entire route is about 120 miles in length from Pulo Berhala to Karimon islands, and is bounded on the western side by the coast of Sumatra, False Durian, and the contiguous islands; and on the eastern side by Singkep and other islands off the south and west coasts of Linga, and by Great and Little Durian, and the adjacent islands.

There is deep water in the fairway throughout, but it has not been closely surveyed.

Winds, *see* pp. 25 and 515.

SUMATRA COAST.—Tanjong Bong or Jabong.—The coast of Sumatra from Batakarang point to Tanjong Bong, has been described at page 503. Tanjong Bong is the south-eastern limit of the Inner route. Like most other parts of the east coast of Sumatra, it is low land, and has a mudbank extending many miles north-west and south-east of it.

See charts, Nos. 1,789 and 2,757.

* Mr. W. Stanton, Master R.N.

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ISLETS and DANGERS.—Berhala (Varella) is a small island 450 feet high, having a hill on its western part which may be seen from a distance of 20 miles in clear weather. It lies in the middle of Berhala strait, with Tanjong Bong, bearing S. by W. distant 10 miles.

Some islets and rocks lie near Berhala, the largest of which, Anak Berhala, is about one mile north-eastward of it, with from 7 to 9 fathoms water between; at one mile northward from Anak Berhala lies a sunken rock, with 17 fathoms close-to, having a channel 2 miles wide, with 10 to 16 fathoms, between it and Middle rocks.

Anchorage.—Water.—There is anchorage on the south-west and north sides of Berhala, in about 6 fathoms, at two cables off shore. A path leads from about the middle of the north side to the centre of the island, where water may be procured.

Shoal.—Captain G. Kunst, of the Dutch barque *Louisa Kroon Prinses of Sweden*, reported in 1864 having seen a shoal, with about 12 feet water, from which Berhala island bore W.N.W. distant 3 miles.

Middle rocks, partly dry at low water, lie 5 miles N.E. ¾ N. from Berhala, or nearly midway between the latter and Singkep Laut islands.

Pollux rock with 4 feet water lies nearly 2 miles north-east of Middle rocks; a bank with 4 fathoms or less extends north-eastward of it.

Berhala strait, the channel southward of Berhala island, is wider and more free from danger than that northward of it, and is consequently more frequented. The shallow bank projecting about 8 or 9 miles north-westward from Tanjong Bong forms an elbow, which will be avoided by keeping Tanjong Bong bearing southward of S.E. ½ S., until Berhala island bears eastward of E.N.E.

The channel to the northward, between Berhala and Singkep Laut islands is about 10 miles wide, and encumbered with Middle rocks and the other dangers mentioned above; but little is known of it.

SINGKEP, the easternmost of the three islands forming the north side of Berhala strait, is about 20 miles in extent, and of

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See charts, Nos. 1,789 and 2,757.

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irregular shape. Baru bay, about 3 miles deep, lies between its two southern points. On the eastern side of the island is a range of hills, with Singkep peak, 1,732 feet high, near the centre of the range. There is a hill over cape Buku, and 4 miles to the northward on the west coast of the island, is Sharp peak of moderate elevation. From cape Buku the coast trends in a northerly direction for 14 miles to Saboyoro strait; rocks above and below water front the whole of it, to the distance of one mile.

Saboyoro strait lies between Singkep and Mandara island, but nothing is known of it beyond what is shown on the chart. Its southern entrance is apparently barred by a reef which extends from Saboyoro point north-westward and encircles Rawa island, the westernmost large island off Singkep.

Silenseng, a small island 119 feet high, lies 3 miles north-westward of Rawa island, and is separated from it by a channel with charted depths of 9 to 20 fathoms. The island is surrounded by a reef which on its north side extends three-quarters of a mile.

Bunta, or Wright islet, lies 1½ miles northward of Silenseng, and is marked by a reef which extends a quarter of a mile in places.

Seera island, is small, 160 feet high, and lies 6½ miles westward of cape Buku. Several islets are situated on the reef which surrounds the island, extending 2 miles north-westward, and one mile south-eastward of it.

Anak Seera are rocky islets lying about 3 miles northward of Seera, on the eastern edge of a reef which extends 2 miles north-westward of them. Between this reef and that extending from Seera island there is a channel about one mile wide, with charted depths of 7 to 10 fathoms.

James rock, a pinnacle, lies in the channel between Seera island and Singkep, with cape Buku bearing S.E. ¾ E., and Seera island south extreme W.S.W. A patch of 4½ fathoms lies about 2 miles N.N.W. of this pinnacle, nearly midway between Anak Seera and Singkep.

Patches of 4½ and 5 fathoms, lie from 4 to 6 miles northward of Anak Seera, fronting Saboyoro point.

See charts, Nos. 1,789 and 2,757.

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Speke rock, lies with the north extreme of Seera island bearing E. by S. ¼ S. distant 9 miles. It is small, and uncovers at two-thirds ebb, showing as a small black rock about the size of a boat, with depths of 8 fathoms close-to. Buku cape kept open to the southward of Seera island, leads southward of the rock, and Mudiu island bearing N.W. by N. leads to the westward.

There is a passage between Speke rock and Seera island, avoiding the 4 fathoms patch lying about midway; and also between Speke rock and Alang Tiga islands, avoiding Atkin rock. The depths charted in this passage are from 6 to 8 fathoms, muddy bottom, and in some places sand; but the channel westward of Alang Tiga islands is preferable.

Alang Tiga islands lying about 30 miles north-westward of Berhala, form a group of five small islands, and some rocks above water. The three principal islands are high, and may be seen from a distance of about 25 miles in clear weather, and the others about 14 miles. They may be passed at a prudent distance on their western side, the depths being mostly from 6 to 8 fathoms, mud, in the fair channel. In working, the coast of Sumatra may be approached to 6 fathoms water, and from this depth to about 8 fathoms towards the islands, is a fair track, although the depths are not always regular.

Atkin rock is said to be a small pinnacle which uncovers at two-thirds ebb, and steep-to; when covered, unless the tidal stream is running strong, there is no indication of it.* The marks given for the rock are, the west extreme of Beralas, just shut in by the east extreme of Alang Tiga island, and the south extreme of Muju island bearing N.W. by W. ½ W., distant three-quarters of a mile.

JAMBIE BAY.—From Tanjong Bong (page 543) the coast of Sumatra trends sharply to the westward, forming Jambie bay and the delta of the Jambie river, the principal entrance of which, named Niur river, is situated about 33 miles from that point. This coast is fronted by a mudbank which in places extends nearly 7 miles off.

Berba island lies off the eastern mouth of the river, 10 miles westward of Tanjong Bong.

Anchorage.—There appears to be good anchorage in 6 to 8 fathoms, 7 or 8 miles northward of Niur river.

See charts, Nos. 1,789 and 2,757.

* H.M.S. *Rifleman*, in February 1864, searched in vain for this rock.

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Niur river is fronted by the mudbank fronting the coast to a distance of about 7 miles. There are two channels into the river; the western is the deepest and has a least depth of 9 feet on the bar; within the river the depth is from 4 to 5 fathoms.

Buoyage.—A beacon buoy with ball, is moored at the navigable entrance of the Niur, about N. by W. ½ W. 5 miles from Solok, at the outer edge of the flat; within this buoy, the floating marks on the starboard hand on entering have each a ball, and on the port hand a cross.

Towns.—There are several towns and villages on the banks of this river, the principal of which is Simpang about 20 miles, and Jambie about 50 miles from the entrance.

The Dutch have a station and fort at Muara Kompeh, a town 5 miles above Simpang.

Communication.—Once every four weeks, the mail steamer which runs between Batavia and Palembang every 9 days, proceeds from Palembang *viâ* Muara Saba and Simpang to Jambie and back *viâ* the same ports.

COAST.—Westward of the Niur river are the Tongkat and Rateh rivers, at the distances of about 23 and 30 miles, respectively; nothing is known of these beyond what is shown on the chart.

Baso island.—Baso or Bakau point is the south-east extreme of Baso island, which is 20 miles in length, and the easternmost of the several islands lying in the approach to Indragirie river.

The eastern coast of Baso island should not be approached nearer than about 2 miles, as a shoal, steep-to, projects nearly one mile off.

AMPHITRITE BAY is about 16 miles deep, formed between the north-east extreme of Baso island and Baru or Datu point, 15 miles to the northward. It is nearly filled by a shoal, which extends several miles from its north and south shores; between is the deep water portion of its bay, about 3 or 4 miles in breadth, with charted depths of about 6 fathoms.

Indragirie river.—The large river Indragirie discharges itself through several channels into Amphitrite bay, and also into the bay westward of Jambie bay.

See charts, Nos. 1,780 and 2,757.

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Caution.—The outer edges of the shoal extending from the points of entrance to Amphitrite bay, are steep-to, having 10 or 11 fathoms within half a mile in some places, shoaling rapidly to 2 fathoms; they should be given a wide berth.

THE COAST.—All this part of the coast of Sumatra is flat low land, thickly wooded with trees about 120 feet high.

From the low headland of Baru point, the coast trends northward towards Durian strait, and is fronted by a shallow bank from 2 to 6 miles off shore, which may be approached by the lead, as, from 10 fathoms upon its edge the depths gradually decrease to 3 fathoms.

Kateman river.—At about 22 miles northward of Baru point is Kateman river, with an entrance at either end of the island of the same name. The southern entrance is known as Pedada strait.

The villages of Pandak and Bakawan are situated about 8 miles up the river.

About 5 miles northward of Kateman island are the Durei islands, mentioned on page 556.

LIMA and PENUBA STRAITS.—Pulo Penuba is an island 6 miles in length, in an east and west direction, 2 miles in breadth, and having a hill 955 feet high near its centre. It lies between Singkep and Linga, dividing the passage between those islands into two channels, named Lima and Penuba straits.

Lima strait, between pulo Penuba and Linga, is narrow, much encumbered with islets and dangers, and should not be navigated with the existing chart except by those locally acquainted. It is said to be safe, and that in the bay on the Linga shore westward of Bongon point there is good anchorage, and wood and water are obtainable.

Horsburgh states that Lima strait is a short route from Linga road to Durian strait, the depths in it varying from 7 to 14 fathoms, that it may be navigated with care by vessels of moderate size, and furnishes the following directions:—If bound from Linga road to the westward, through Lima strait, steer out to the southward and south-west, till near the north-east part of Singkep, to give a berth to the islets off Bongon point, and the extensive shoal which stretches thence to the road. Having passed about mid-channel between the islets off Bongon point and those northward of Penuba

See charts, Nos. 1,789 and 2,757.

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island, steer for Labodado point, the west point of Linga; the depths will be 12 and 14 fathoms near the islets and rocks on the south side of the strait, and 9 or 10 fathoms towards the Linga shore; the bottom is hard in the eastern part of the strait, and soft to the westward. Having passed Labodado point, steer about W. by N., in depths of 11 to 9 and 8 fathoms, soft bottom, and passing about 2 miles northward of Pandan island, in 7 to 9 fathoms, steer to the north-westward for Durian strait.

Penuba strait, between Singkep and Penuba island, is, like Lima strait, very narrow and encumbered with islets and dangers, and should not be attempted without local knowledge. Judging from the chart, it appears that it may be entered from the eastward between the small islets Serang, Tenga, and Kekker, and a mid-channel course followed through its narrowest part. After passing the narrows, keep within three-quarters of a mile of Penuba, to avoid two rocky patches, nearly in mid-channel at the western end of the strait.

The depths in the narrow part of the channel are 15 to 20 fathoms, but at the western end there are not more than 4 or 5 fathoms between the rocky patches and Penuba, and only 3½ to 5 fathoms between them and Singkep. A vessel of moderate draught may probably pass through with safety on the Singkep side.

PULO BAKONG (SETJAWA) lies close to the north-west extreme of Linga, from which it is separated by Dasi strait, about half a mile in breadth. The west coast of this island trends in a north-westerly direction about 14 or 15 miles, the shore being fronted to a short distance by a reef.

Close to the north-west part of Bakong lie two small islands named Great and Little Blando, the latter, which is the north-western one, having two islets near its west side.

Champa strait.—Champa, an irregularly shaped island, about 5 miles in length, and 2 miles in breadth, is separated from the north-western part of Bakong and the Blando islands by Champa strait, 2 miles wide, having depths of 13 to 30 fathoms. In the northern entrance of this strait lies a narrow bank, 2½ miles in length, having from one to 2 fathoms water, with 8 to 14 fathoms in the narrow passage between it and the Blando islands. The channel between the bank and Champa is one mile wide, with depths of 9 to 14 fathoms.

See charts, Nos. 1,789 and 2,757.

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Buaya island lies 3 miles westward of the north-west of point Champa, and in the channel separating them there is a group of islets and rocks. Buaya nearly three miles in extent, is a remarkable island, rising to a peak 888 feet high.

Dian is the south-easternmost and Lobam the north-westernmost of a chain of islets fronting the south and south-west sides of Buaya, from which they are separated by a channel with depths of 12 fathoms; there is a rock near the west side of Buaya.

Leda rock is the outermost of a ridge of rocks which extend about 1½ miles in a N.W. by W. direction from Lobam islet.

TEMIANG GROUP.*—This group with the other islands and dangers between Buaya and Merodong islands lie far to the eastward of the usual track of vessels bound through Durian strait; but it seems advisable to describe them for the benefit of navigators who may wish to pass through any of the channels leading into or from Rhio strait. This group is composed of four large and several small islands, lying to the north-westward of Bakong and Sebang, and separated from those islands by a narrow channel, which appears to be obstructed by rocks.

Temiang island, which limits the group to the north-eastward, is 7½ miles in length, 3 miles in breadth, and irregularly shaped, the north-east side being nearly straight, but at the south-east end there is a deep inlet; there is also an inlet at the north-west end. This island, which is the largest of the group, is mostly composed of high hills, and near the west end on some table land is mount Buanaja, 800 feet high.

The three other principal islands which lie close to the south-westward of Temiang, are divided from it and from each other by narrow channels, and the group is limited in that direction by Ompok island and several islets standing on a reef 3 miles in length. Close-off the north-west end of Temiang is Pintu island, 430 feet high, and beyond it is Kebat island, 240 feet high. All the islands are fringed with reefs.

Pompong island, situated about 2 miles south-westward from Kebat, is rather more than half a mile in diameter, having in the centre a hill 433 feet high. A sunken rock lies W. by N. half a mile distant from the north extreme of the island; and a reef with rocks

* *See* chart of Rhio strait, No. 2,413; also charts, Nos. 1,789 and 2,757.

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above water is situated at three-quarters of a mile N.N.E. from Pompong, and nearly the same distance N.W. from the north-west islet of the Babi group.

Pompong reef, N. ¼ E., distant 2½ miles from Pompong island, consists of three or four rocks several feet above water. A rock awash lies a quarter of a mile to the westward, and between are depths of 5 to 8 fathoms, with 12 to 15 fathoms close to the reef.

Irene rock, said to lie W. by N. ¼ N., about 7 miles from Pompong island, could not be found by H.M. surveying vessel *Rifleman* in the course of a four hours' search, but the examination was insufficient to disprove its existence.

Buaya island bearing S.E. by S., or Pitong island North, leads from 3 to 4 miles westward of the assigned position.

PANGELAP GROUP.—Allor, the southernmost of the Pangelap group, is a small round island, 139 feet high, situated on a reef half a mile across, at 4 miles northward of Kebat, the north-west extreme of the Temiang group.

Pangelap island, the largest of the group, is 3 miles in length, half a mile in breadth, and moderately elevated, the highest hill on the southern part being 247 feet, and that on the northern 266 feet high; the island is fringed by a reef, which projects in places on the east coast to a distance of a quarter of a mile, but on the west coast to a less distance. A flat rock, just above water, lies one cable south-eastward of the south point.

Dedap, about 1½ miles in length, lies to the westward of Pangelap, from which its southern and nearest part is distant three-quarters of a mile. Three small islets are situated on the reef extending half a mile south-eastward of the island, and detached rocks, awash, lie about 6 cables south-eastward of the reef.

At about half a mile off the north-west extreme of Dedap lie two small islets, encircled by a reef, forming the southern limit of Abang strait.

MERODONG GROUP lies to the westward of Niamok and Mesana (page 518), and comprises six islands, separated by narrow unavailable channels. Merodong or Rodong, the northern

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See chart, No. 2,413.

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island, is 797 feet high, and one of the principal landmarks for making Rhio strait (also on pp. 510, 519). The three eastern islands are known as the Desie islands; the two western as the Madang islands.

The channel between Mesana and the Merodong group is encumbered with dangers, and should not be used.

Dua islands, situated about 2½ miles westward of Madang islands, are two low islands, each encircled by a reef extending in some places a quarter of a mile from the shore and divided by a narrow channel having a depth of 4 fathoms. Two reefs, each about half a mile in extent, and separated by a narrow deep-water channel, lie from 1½ to 2 miles north-westward of Dua islands. On the south end of the southern reef is an islet, and at the north end are some rocks above water; on the north-east extreme of the northern reef is Tree rock, 14 feet above high water.

A coral patch, with 3 fathoms water, and 11 to 14 fathoms close around it, lies N.W. by W. ¾ W. one mile from Tree rock.

TITAMPAN GROUP, situated north-westward of the Merodong group, occupies a circular space about 4 miles in diameter, and comprises several islands, islets, and rocks, separated from each other by narrow intricate channels which are obstructed by numerous reefs and dangers. Titampan, the south-western island, is 390 feet high, and the most conspicuous of the group; Binan and Katang Linga (p. 519) form its eastern and northern limits, and the Nopong islands, with the adjacent islets and reefs, its north-western.

TEMIANG STRAIT, leading from the China sea to Durian and other straits adjacent, is about 14 miles in length in a west-north-west and east-south-east direction, and 2 miles in breadth; on its south-side are the northern islands of the Sebang group, Temiang, Pintu, and Kebat, and to the northward are Niamok, the Merodong group, Dua islands, and Tree rock reefs.

A pinnacle rock, awash at low water, and difficult to make out, lies in the eastern entrance of this strait, about one mile N.E. of Reman islands, a group of small islands off the south-east extreme of Temiang. This danger may be passed on either side, but it is preferable to pass to the northward.

See chart, No. 2,413.

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MERODONG STRAIT, between the Merodong and Titampan groups, is also navigable; it has a general depth of 12 fathoms over a fairway about 1½ miles wide.

A rock awash lies N.E. by N. distant 6 cables from the north point of Merodong; and there are also two patches of reef, one lying a quarter of a mile south-eastward, and the other half a mile south-westward, of the southern island of the Titampan group. Besides avoiding the first-mentioned danger, vessels when working should not stand to the southward of a line joining the northern extremes of Merodong and Mesana islands.

If using the channel between the Titampan group and Dua islands, take care not to stand within three-quarters of a mile of the south-west islands of the group lying between Titampan and Little Nopong.

PANGELAP STRAIT is bordered on the east by the Titampan group and Selanga islands, and on the west by Allor, Pangelap and Udik. It is not less than 1½ miles in width in the main fairway, with depths of 12 to 30 fathoms.

A bank about 2 miles in length, with 6 to 10 fathoms water, lies on the western side of the main fairway of this strait, having on the northern end a rock awash, from which north Selanga island bears E. ¼ S. distant nearly 2 miles; from the rock the bank trends in the direction of Allor island, with a patch of 2¼ fathoms, hard sand, near its south end, from which Allor island bears S.S.W. ¾ W. distant 1½ miles. Off the east side of Pangelap, a hard mudbank extends nearly one mile, with 5 to 10 fathoms water, and a bank of sand half a mile in extent, with about the same depth of water, extends eastward of Udik; elsewhere the soundings are irregular, 13 to 28 fathoms.

Owing to the uneven nature of the bottom, the strong tidal streams, near springs, cause whirls and overfalls which are somewhat alarming to strangers, but it seems only necessary to avoid the above described dangers to pass safely through the strait, as none besides those could be discovered, though carefully searched for.*

ABANG ISLANDS AND STRAIT.—Little Abang island, about one mile in extent, lies 2 miles north-westward from Dedap,

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See chart, No. 2,413.

* Staff Commander J. W. Reed, H.M. surveying vessel *Rifleman*, 1869.

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with the Nio islands, surrounded by reefs, lying nearly one mile from its eastern side. The Sapientu islets and rocks lie from a quarter to three-quarters of a mile southward of Little Abang. A rock, with 3 feet water, and 4 to 9 fathoms close-to, lies W. ¾ S., nearly one mile from the south-west point of Little Abang.

Abang strait.—Between Dedap and Little Abang is Abang strait, reduced to the breadth of one mile by two islets which lie half a mile off the north-west end of Dedap, and by the Sapientu islets and rocks. The depths near the islets are 7 fathoms, with 12 fathoms in mid-channel, increasing to 20 or 30 fathoms between the north point of Pangelap and the Nio islets. (*See* directions at page 565.)

Great Abang island, 4 miles in length and 2½ miles in breadth, is situated north-west of Little Abang; it is separated from the latter by a channel with 3 to 9 fathoms, which is contracted near the centre to one cable in breadth by an island near Great Abang, and the reefs extending from both islands.

Hippomenes rock.—Close to the west side of Great Abang is Tortel islet, and W. ¾ S. nearly 1½ miles from this islet is Hippomenes rock, awash, with 7 to 10 fathoms around it.

Cameleon rock is small, about one foot above high water, with 7 to 11 fathoms close to its west side; it lies with the summit of Pitong bearing N.N.W. distant 6¾ miles, and the south point of Little Abang E. ¾ N. distant about 7 miles. Patches of 3 and 2½ fathoms are situated from a quarter to half a mile northward and north-eastward of the rock.

Pitong, if not brought to the westward of North, will lead well clear to the westward of Cameleon rock, and of the reported position of Irene rock.

Pitong island, lying 5 miles W.N.W. from Great Abang, has several hills, one of which is 462 feet high. The island is surrounded by numerous islets and rocks, which, off its south-east side, extend three-quarters of a mile. Off the north-east side the depths are irregular and somewhat shallow, 3¼ fathoms being found at two-thirds of a mile, and 2¼ fathoms at one-third of a mile from it.

Off its west side isolated and sunken patches extend about one mile south-west from its north-west extreme.

See chart, No. 2,413.

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Pulo Anak Pitong, composed of two islets nearly one mile in extent, lies about 2½ miles westward of Pitong island, with charted depths of 12 to 18 fathoms in the channel between.

Gull rock or islet lies one mile west-north-westward of Anak Pitong. Westward and northward of it are patches of 4 to 5 fathoms; and others may exist which are not charted, as that portion has not been surveyed.

A patch of 3 fathoms is charted 1¾ miles N. by W. ¼ W. of Gull rock.

Dempu strait, about 7 miles in length in a north-west and south-east direction, and 3 miles in breadth, lies between the Abang islands aud pulo Galang. Fringing reefs extend from 2 to 4 cables from the islands bordering the strait.

Dempu strait affords easy navigation, the fairway being perfectly free from danger; the following rocks lie so near the islands that they may be easily avoided.

Haai reef, a patch of 2 fathoms, lies a quarter of a mile S.S.E. from pulo Dempu (p. 520); a rock, with 6 feet water E.S.E. half a mile from the south-west point of Galang; a rock above water, one-third of a mile E.S.E. from the north point of Great Abang; and Penjabung rock, S.W. ¼ S., half a mile from the north point of the island of that name.

This last will be avoided if the south-west point of Galang be kept open of the south-west point of Penjabung, or the summit of Tafelberg, on Galang island, open westward of Semut island. The depths in the strait are irregular, varying from 11 to 24 fathoms. (*See* directions at page 565.)

THE STRAIT OF DURIAN, between Great and False Durian, is nearly 4 miles wide; the Brothers islets lie in its southern approach, and may be passed on either side. The channel eastward of the Brothers has from 10 to 15 fathoms, and is 4 miles wide; that to the westward has from 8 to 14 fathoms, and is 3 miles wide; both are said to be equally safe; the depths are sufficient for all classes of vessels, but it is possible that dangers uncharted may exist, as there are many portions that have not been closely sounded.*

See chart, No. 2,413.

* *See* chart of the straits of Durian, Sugi, and Jambol, No. 2,402. For directions, *see* pages 563–567.

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Three Brothers.—South Brother, 257 feet high, is the largest and highest of the three islands lying at the south entrance of Durian strait. It is one mile in length, and about one-third of a mile in breadth, and may be seen from a distance of 17 or 18 miles in clear weather. A white cliff on the north-east side makes this island remarkable.

A reef extends to the distance of about 2 cables in places around the island.

Middle Brother, 135 feet high, lies about one mile northward of the South Brother. Between the South and Middle Brother there is a passage about two-thirds of a mile wide, with depths from 8 to 13 fathoms.

North Brother, or Round island, 87 feet high, is smaller and lower than the others; it lies N. by W. distant 2½ miles from Middle Brother. A straggling reef partly dry at low water, with a rock above water at its southern end, extends three-quarters of a mile S.S.E. from North Brother. Between this reef and Middle Brother there is a passage 1½ miles wide, with 11 to 17 fathoms water; vessels using it should keep within one mile of Middle Brother, to avoid North Brother reef.

Eastern bank, lying to the eastward of the Brothers, is composed of hard sand, having irregular depths of one to 6 fathoms, with 10 to 12 fathoms close to its western edge. From the North Brother, its south extreme, with a depth of 5 fathoms, bears East, nearly 5 miles.

Durei islands.—Several low mangrove islands, named the Durei islands, lie between 2½ and 9 miles northward of the Sumatra coast. Sandam Laut or South island, the south-easternmost of the group, is small, 90 feet high, and surrounded by rocks. The north-easternmost one, Sandam Besar or Long island, about 6 miles westward of the South and Middle Brothers, is 1½ miles in length; at one mile north-westward of it is a higher island, named the Saddle. South-westward of Sandam Besar is pulo Durei. All the information at hand, on the islands between the Saddle and pulo Belat is expressed on the chart.

FALSE DURIAN or pulo Sanglar, is an irregular shaped island 604 feet in height, and about 2½ miles in extent, and with the adjacent islands, forms the south-western limit of Durian strait.

The Rocky islands, a group of islets and rocks, extend about one-third of a mile off the north-west point of False Durian; a bank with

See chart, No. 2,402.

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4½ to 5 fathoms water, one mile in extent, lies between one and 2 miles north-westward of the same point. Other islands lie close south-westward of False Durian.

Patches.—Several patches of 2 to 3 fathoms lie within the five-fathoms line on the bank southward of False Durian, for which *see* chart.

Clearing marks.—These patches and the bank off the Sumatra coast will be avoided by keeping South Passage island open eastward of the Rocky islet at the east extreme of False Durian ; or by keeping the peak of Great Durian westward of N. ¾ W. ; and it is advisable for vessels other than of light draught, not to stand to the westward of that line, for from the irregularity of the bottom other shoals may exist.

Richardson shoal is about one cable in extent, with a depth of 2¾ fathoms, and 7 to 10 fathoms, around, and between it and the east side of False Durian island, which is distant about half a mile, with the peak of that island bearing W. by N., distant 2$\frac{1}{10}$ miles.

GREAT DURIAN or MORO BESAR, on the north side of the strait of Durian, is 3¾ miles in extent, with a peak near its centre 965 feet in height. A bank with less than 5 fathoms extends about 1½ miles eastward of its south-east extreme.

The Tombs is the name given to the islets and reefs, extending about three-quarters of a mile from the south side of Great Durian.

A coral reef, steep-to, lies half a mile south-westward of the Tombs and about one mile S.E. by S. from the south-west point of Great Durian. Great Durian peak bearing North, leads westward of these dangers, and False Durian peak bearing S.W. ½ W., leads south-eastward of them.

Little Durian or Moro Kechil, 590 feet high and 2 miles in extent, lies close westward of Great Durian. Some rocks lie near the south-west side of Little Durian, and a small islet with a rock outside it lies off the north-west point.

South Passage island, situated three-quarters of a mile south-westward of Little Durian, is 204 feet high, about half a mile in extent, and surrounded by rocks lying close to the coast.

See chart, No. 2 402.

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North Passage island, 156 feet high, is 2 cables in extent, and lies 2¼ miles N.W. by N. from South Passage island.

Princes island, lies abreast of and 2¾ miles distant from North Passage island, on the western side of Durian strait; it is low, of coral formation, covered with trees about 100 feet high, and having a round and conspicuous appearance. On the eastern side there is a coral ledge, nearly awash at low water, and extending 3 cables; a reef apparently extends half a mile south-west of the island.

The Strait of Sanglar, lying to the northward of Great and Little Durian, and southward of the islands of Jang, Sugi, and the Monkey group, may be considered one of the southern entrances to Durian strait; it is but partially surveyed, and does not offer any advantages to induce a vessel to proceed through it, but on the contrary is inferior to and less direct than the other channel. The strait is about one mile wide, with two islands in it, which reduces the width of the navigable channel to little more than half a mile.

The soundings that have been taken in this strait and its approach are few, and as it is quite possible that shoaler parts than those known of may exist, it is not therefore recommended.

If used, the pecked line on the chart should be followed as near as possible.

The charted depths between Eastern bank and Great Durian vary from 9 to 14 fathoms. Vessels should not go nearer to the east coast of Great Durian than 2 miles, on account of a bank which projects 1½ miles from that side of the island, with 5 to 3 fathoms water, and possibly less in places.

In the eastern part of the strait of Sanglar the depths are from 18 to 12 fathoms, decreasing to 10, and 7 fathoms at its western end. Just north of the fairway of the western end is a patch of 4 fathoms, from which the north-west extreme of Little Durian bears S. by W. ¼ W., distant nearly one mile.

SUGI BAWA ISLAND lies northward of Great Durian; it is 5½ miles in length, in a north-west and south-east direction, and about one mile in breadth. Between it and Sugi island, to the eastward, is the strait of Sugi.

Sugi Bawa is but imperfectly known, and but few soundings have been obtained in its neighbourhood.

See chart, No. 2,402.

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Monkey islands, three in number, lie from one to 2 miles westward of the south part of Sugi Bawa; Jadi, the middle island, is the largest, and is about half a mile in diameter. The others are named Murus and Sarang.

Reefs.—Two patches of reef lie half a mile off the west point of Sarang, the westernmost Monkey island. The west extreme of Little Durian, bearing S.S.E., or North Passage island S.W. by S. leads westward of them. In the channel between these reefs and North Passage island, the depths are 27 to 28 fathoms close to the island and in the fairway, but near the rocks they are about 15 fathoms.

Belukar, or Dolphin island, 153 feet high, situated off the north-west end of Sugi Bawa, is about one mile in extent, and fronted on its western side by a coral reef to the distance of 2 cables, with irregular depths of 9 to 20 fathoms close-to.

A sunken rock lies one-third of a mile N.N.W. from the north extreme of Belukar.

A reef, 2 cables in extent, steep-to, and dry at low water springs, lies one mile westward of Belukar island, with the south-west extreme of that island in line with the sandy north point of Sugi Bawa, and with Red island bearing N.N.W.

Pulo Bolombo, or Panjang, the southern end of which lies about one mile eastward of the north end of Sugi Bawa, is high, about 3 miles in length, north-west and south-east, and half a mile in breadth. The north end of pulo Bolombo is fronted by a reef to a distance of nearly half a mile, having a white rock within its north-west edge.

The Twins, or pulo Itik, are two small round islands, 152 feet high, lying a little more than one mile north-eastward of Red island, and one mile north-west of pulo Bolombo.

Reef.—At three-quarters of a mile N.W. by W. of the north Twin, is the outer end of a dangerous coral reef 4 cables in extent, dry at low water spring tides, and having from 10 to 17 fathoms around. North Passage island touching or shut in with Red island, leads westward of it.

See chart, No. 2,402.

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Red island (pulo Mantards), lying nearly 2 miles north-west of Belukar island, is of a triangular shape, about half a mile in extent, and covered with trees. It is 256 feet in height, and visible 15 miles in clear weather.

Nearly half a mile northward of Red island is a rocky islet with a tree on it, surrounded by rocks dry at low water, between which and Red island the depths are 15 to 16 fathoms.

Rocks.—Nearly in mid-channel in the passage between Red and Belukar islands lies a rock, awash at low water spring tides and steep-to. From its centre, the north-east end of Red island is in line with the south peak of Great Karimon, and the centre of the Twins bears N. $\frac{3}{4}$ E.

A rocky patch, dry at low water, lies rather more than half a mile W. by S. from the west end of Red island, with deep water all round, and between it and the island. From the centre of the patch, the north-west bluff of Red island is in line with the south end of the North Twin ; and the peak of False Durian is just within the east extreme of South Passage island.

Middleburgh shoal lies nearly midway between Red island and the bank with less than 3 fathoms fronting pulo Belat and pulo Buru ; it is a reef of coral rocks, 300 yards in extent, dry about one foot at low water spring tides, with 7 to 9 fathoms close to the rocks, and 17 to 20 fathoms about one cable off. From the centre of the shoal, the Passage islands are in line ; and the rocky islet with a tree on it, off the north end of Red island, is nearly touching the North Twin.

Clearing mark.—The whole of South Passage island open eastward or westward of North Passage island clears Middleburg shoal. The peak of False Durian touching the east side of North Passage island leads in mid-channel, between it and the patch situated half a mile westward of Red island.

Pulo Belat and pulo Kundur.—Pulo Belat, and pulo Kundur to the westward of it, are the largest islands on the west side of the strait of Durian, their northern extremes reaching to within about 5 miles of Great Karimon. Close north-eastward of them are pulo Buru, Papan, Parit, and Tulang, the two last mentioned forming the south side of Gelam strait. The hill on the north-east extreme of

See chart, No. 2,402.

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Papan is said to be remarkable as being the only hill on the west side of the channel southward of Karimon island.

Deep Water point, the most eastern point of Belat, lies nearly 3 miles north-west from Princes island. A reef, with some trees upon it, lies S.S.E. nearly one mile from the point; it will be avoided by keeping False Durian peak open eastward of Princes island. From Deep Water point the coast of Belat trends west-north-westward, and lying between it and pulo Buru are several islands.

There is a depth of 5 fathoms within a short distance of Deep Water point, and 8 to 9 fathoms beyond; the bight to the northward is fronted by a bank with less than 3 fathoms out to a line from Deep Water point to a position half a mile eastward of pulo Buru.

PULO BURU is a low island about 4 miles in length, crowned with high trees and having a few inhabitants, who grow quantities of mangosteins, durians, and other fruits, which flourish here.

The eastern shore of pulo Buru is fronted by a shallow bank to a distance of one to $1\frac{1}{2}$ miles, with rocks awash at half tide nearly to the same distance. This bank, and its continuation to the southward, will be avoided by keeping Deep Water point southward of S. $\frac{3}{4}$ E.

Pulo Pandang, the southern of two small islands lying about one mile northward of pulo Buru, is low, and covered with trees about 100 feet in height.

Pulo Parit is much larger than Pandang, and lies to the westward of it. But little is known of these islands and others in their neighbourhood.

Sand banks.—A small patch of 5 fathoms lies E. $\frac{1}{4}$ S. distant $1\frac{1}{2}$ miles from pulo Pandang; and three patches of $4\frac{3}{4}$ fathoms lie E. $\frac{1}{4}$ N. $2\frac{3}{4}$ miles, E. by N. $\frac{1}{2}$ N. 2 miles, and N.E. $\frac{1}{2}$ N. the same distance from it; a patch of 3 fathoms lies one mile north-west of Pandang, south side of Gelam strait.

The peaks of Little Karimon in line, about N.W., lead eastward of these banks. (*See* Karimon islands and dangers, p. 112.)

Philip channel, *see* p. 195, and directions for, at p. 567.

SUGI and JOMBOL are two islands lying to the north-eastward of Great Durian island. Sugi is about 10 miles and Jombol

See chart, No. 2,402.

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about 7 miles in length, both in a north-west and south-east direction; Chitlim, south east of Jombol, is about 3 miles in length, with the Seranjan islands beyond. Numerous patches, with depths of one to 3 fathoms, extend about 3 miles south-eastward of Sugi, and to nearly the same distance in all directions from Seranjan islands; these will be better understood by referring to the chart.

The Bulang archipelago, of which Kapala Jeri is the westernmost large islet, form the east side of the northern approach to the Strait of Durian, and more particularly to Jombol strait. Pulo Jangkan is situated about 4 miles westward of the south end of Kapala Jeri, with numerous islets and reefs between and in the direction of Steep cape, and also between Jangkan and Jombol. Some of these islands are inhabited. (*See* also p. 196.)

Caution.—In the present state of our knowledge no vessel should venture among these islands, and it is, therefore, only the outermost islands and dangers which concern the ordinary navigator; those will be next described, after the following brief observations on the channels between the larger islands.

The Strait of Sugi lies between Great Durian, Sugi Bawa, and Bolombo islands on the west, and Eastern bank and Sugi island on the east. There are many islands and rocks in this strait, which has been but imperfectly surveyed; it is, however, navigable with proper care.

The electric telegraph cable between Singapore and Batavia passes through this strait.

The Strait of Sulit, between Sugi and Jombol, is also imperfectly known, but it is certainly encumbered at both ends with many dangers, some of which appear on the chart.

The Strait of Jombol, between Jombol and Bulang, is also encumbered with many dangers, although apparently not to so great an extent as Sulit; it at present, like the other straits, is not available for general navigation.

Batu Haji strait, between Bulang and Batam, is very narrow, in some places not a quarter of a mile in breadth. A running survey was made of this strait many years ago by Mr. L. C. Bailey, Master, R.N., and it is said to be available for vessels, but no directions can be

See chart, No. 2,402.

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given for it. Some years ago it was urged upon the attention of nautical men at Singapore as being a route by which vessels could be speedily towed from Singapore road to sea in the north-east monsoon; but it will have to be properly surveyed before it can be used for such a purpose. (*See* also p. 197.)

TIDES.—It is high water full and change, at Red island and Deep water point, in Durian strait, at 10h., and the springs rise about 10 feet. Throughout Berhala and Durian straits the tidal streams are irregular, rendering it difficult to define either their direction or velocity. In August and September the rise and fall was found generally to be between 10 and 11 feet, with a velocity sometimes of from 3 to 4 knots per hour during springs; at other times not more than 2½ knots at the same period. This irregularity appears to be produced by the prevailing winds in the north or south entrance of the straits, forcing the streams through in one direction for 12 or 18 hours at a time, although the rise and fall on the shore was regular. But sometimes the streams run with regularity.

Ripplings.—The ripplings met with in the straits might be alarming to a stranger; they appear to be caused by the uneven bottom, and the resistance the streams meet with from the steep reefs and numerous small islands.

DIRECTIONS.*—Banka strait through the Straits of Berhala and Durian to Singapore.—Steam vessels use Rhio strait, but as stated on p. 548, Berhala strait during the strength of the north-east monsoon is frequently used by sailing vessels, but it must be borne in mind that it is but imperfectly surveyed.

To proceed by this route, from the north entrance of Banka strait and having passed Frederick Henry rocks,† a course should be shaped for Berhala island, distant about 78 miles. The bank along the Sumatra coast being shelving, the lead will be the best guide, and the rule is to keep in from 5½ to 7 fathoms. In working, the coast may be approached with care to a low water depth of 5 fathoms, observing that the bank, with from 4 to 5 fathoms water, extends from 10 to 12 miles S.E. by E. from Tanjong Bong.

The tidal streams near the shore are generally strong; in the offing they are irregular, and currents sometimes prevail.

* Mostly from Horsburgh. *See* charts Nos. 2,757, 1,789, and 2,402.

† Directions continued from p. 425.

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In passing southward of Berhala island, keep in 10 to 12 fathoms towards it, to give a berth to the bank of hard ground projecting from Tanjong Bong; thence in working along the coast to the westward, the bank is steep-to, and may be approached occasionally, with care, to 8 or 7 fathoms.

Standing towards Berhala island, avoid the neighbourhood of Louisa shoal, (2 fathoms water), reported to lie E.S.E., distant 3 miles from that island. Being westward of the narrow part of the strait between Tanjong Bong and Berhala, which is about 7 miles wide, a course should be steered towards the Alang Tiga islands, in depths of 9 to 12 fathoms. With a working wind, the Sumatra coast may be approached to 6 or 7 fathoms. When steering towards the Alang Tiga, the southernmost island must not be brought more westerly than N.W. by N. until Seera island bears southward of E. by S. ½ S., to avoid Speke rock.

In this track attention to the tidal streams is indispensable, for they are often irregular, sometimes setting out of the Jambie river to the north-eastward at the rate of 2½ or 3 knots an hour; and the coast bank to the distance of 14 or 15 miles westward of Tanjong Bong is nearly dry at low water spring tides, in some places 4 or 5 miles from the shore.

Between Alang Tiga islands and Baso island the depths vary from 7 or 8 fathoms near Alang Tiga to 13 fathoms and 14 near Baso; deepening to 15 and 18 fathoms 2 miles eastward of Datu point.

Having passed Alang Tiga at about 2 miles, a course should be steered for the southernmost of the Three Brothers; when the peak of Great Durian is seen over the South Brother, it should be steered for, passing on either side of South Brother.

In working, be careful not to stand nearer to Baso island, or Datu point, than 2 miles, and also avoid being tempted to stretch into Amphitrite bay, as the banks are steep-to, and the lead will give no warning. At 6 or 7 miles northward of Datu point the depths decrease more regularly towards the bank, which may from thence be approached by the lead into 8 or 7 fathoms towards the low Durei islands. In standing to the eastward, do not deepen above 18 or 19 fathoms, particularly as the distance from the Alang Tiga islands is increased, for the ground on that side is foul, and unsuitable for anchorage.

See **charts, Nos. 1,789 and 2,402.**

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Marks for keeping clear of Cameleon rock and of the position assigned to Irene rock, on the eastern side of the channel have been given in page 554, and the navigator is referred to them if he should stand so far over to the eastward, which is, however, out of the fairway track.

Berhala to Singapore by Abang and Dempu straits.—It should be mentioned here that, in order to avoid the difficulty and delay sometimes experienced in getting from the northern part of Durian strait to Singapore road, many sailing vessels have preferred to pass from the Inner route by Abang strait, and Dempu strait, into Rhio strait. It seems probable that the best passages might be made in this way, for the great depth of water in the western part of Singapore strait is often embarrassing in light winds. H.M.S. *Saracen* made a good passage by the Abang strait route, first experiencing all the advantages of the smooth water and less unfavourable tidal streams of the passage inside Linga by Berhala strait, and then passing without the least difficulty through Abang strait into Rhio strait. (*See* pp. 554, 555, and chart, No. 2,413.)

To enter the Strait of Durian eastward of the Brothers.—The pecked line on the chart, No. 2,402, is the fairway track. In standing towards Eastern bank, avoid bringing Great Durian peak westward of N.W. by W.; or if the vessel gets on the edge of the overfalls in making the eastern board, tack immediately, and stand towards the Brothers to 10 or 11 fathoms. When the southern point of Great Durian is approached, the Tombs will be discerned; and also Papan hill, in clear weather, making like two islands, which may be mistaken for the Karimons. Having passed the North Brother at about 1½ miles distance, steer to pass about one mile northward of the north end of False Durian.

If working, by keeping North Passage island open of Little Durian, the sunken rocks south-westward of the Tombs, on the north side of the passage, will be avoided.

To enter the Strait of Durian westward of the Brothers.—The pecked line on the chart, No. 2,402, is the fairway track. It leads about 1⅓ miles westward of the Brothers in 8 to 12 and 14 fathoms.

When standing towards Richardson shoal keep Rocky islet to the westward of S. by W. until the peak of False Durian bears West;

See chart, No. 2,402.

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and towards Great Durian, keep North Passage island open of Little Durian, as before stated.

North-westward of the Brothers.—Having arrived north-westward of the Brothers by either of the tracks just mentioned, the Passage islands will be seen to the north-westward and should be steered for, passing between them and Princes island. In mid-channel the depths will be generally from 17 to 26 fathoms. On approaching Passage islands, Red island, about 6 miles northward of North Passage island, will be discerned, with the two islets north-eastward of it, named the Twins.

The channel westward of Middleburgh shoal is preferable, being about 2¼ miles wide with mostly regular depths of from 16 to 17 fathoms close to the shoal, decreasing gradually towards the western shore over a bottom of soft mud, suitable for anchorage. *See* the pecked line on chart, No. 2,402.

From abreast and westward of North Passage island this track leads 1½ miles eastward of Deep Water point and about one mile westward of Middleburgh shoal. When Red island bears East, keep Deep Water point about South or westward of that bearing, to avoid the dangers extending off pulo Buru and the islands northward, in depths of 10 to 12 fathoms. The peaks of Little Karimon bearing westward of N.W. also clears the dangers which project 3 miles from the shore of Great Karimon island. If bound through Malacca strait round Little Karimon at a prudent distance.

In working, keep South Passage island open westward of North Passage island when in the vicinity of Middleburgh shoal; the western shore may be approached to 5 fathoms.

The channel eastward of Middleburgh shoal, between it and the reef lying W. by S. from Red island, is 2 miles wide. False Durian peak in line with the east side of North passage island bearing S.S.E. ⅛ E. is a good mark, and leads in mid-channel in 14 to 19 fathoms, mud.

In working, and standing towards Middleburgh shoal, do not bring the peak of False Durian open westward of North Passage island more than the breadth of that island; and when standing towards the patch off Red island, tack before False Durian peak touches South Passage island. The tidal streams usually run from 3 to 4 knots an hour between Middleburgh shoal and Red island, the flood setting to the southward, and the ebb to the northward.

See chart, No. 2,402.

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When northward of Middleburgh shoal proceed as directed when passing westward of it (p. 565).

To pass through Phillip channel.—If bound to Singapore and being northward of Middleburgh shoal, with Red island bearing East, a course may be steered, guarding against tide, to pass through Phillip channel in the fairway between Cap and Round islands. Neither of these islands should be approached nearer than three-quarters of a mile, on account of the reefs which project from them.*

In this route, take care that the vessel is not set too near the dangers which lie in the approach to Jombol strait, for the tidal stream runs through it with a velocity of 3 or 4 knots an hour at springs.

Having passed Cap island, bring it to bear S.S.W. astern, which bearing being maintained, will lead through in mid-channel between Round island and Helen Mar reef. The depths in this track vary from 15 to 30 fathoms.

In working, if standing westward of the south end of Round island, do not go farther in that direction than to bring Raffles light-house on with the north-west end of Long island, to avoid the reefs lying south-west of Red island.

Standing towards the north-east sides of Round and Long islands, Cap island should not be brought southward of S. by W. $\frac{1}{4}$ W., or Raffles lighthouse eastward of N. $\frac{3}{4}$ E. Cap island kept southward of S.S.W. $\frac{3}{4}$ W. leads westward of Helen Mar reef, and when the northern peak of Great Karimon is well open northward of Red island, a vessel will be northward of that danger, and may proceed into the fairway of the main channel of Singapore strait. To proceed from thence to Singapore road *see* pp. 206 and 226.

If preferred, instead of using Phillip channel, a vessel, after passing Middleburgh shoal, may steer a course to pass into Singapore strait westward of Tree island.

From Singapore strait through the Straits of Durian and Berhala the preceding directions must be reversed; Rhio strait is to be preferred, as before stated, it having been carefully surveyed, and is also well lighted and buoyed.

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* *See* charts, Nos. 2,402, 2,403, and 2,404.

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„	Frodsham & Keen	31, South Castle Street.
„	John Bruce & Son	27, Wapping.
LONDON	J. Imray & Son	89, 102, Minories, E.
„	E. Stanford	26, Cockspur Street, S.W.
LONDONDERRY	J. A. Minniece	23, Ship Quay Street.
MARYPORT	Quintin Moore	Harbour House.
MIDDLESBROUGH	Constantine, Pickering, & Co.	Docks.
NEWCASTLE-ON-TYNE.	M. S. Dodds	61, Quayside.
„	S. A. Cail & Sons	29, 31, Quayside.
NORTH SHIELDS	Wilson & Gillie	New Quay.
NEWPORT, MON.	E. Williams	94, Dock Street.
OBAN	Hugh Macdonald	"Times" Office, Esplanade.
PLYMOUTH	G. E. Hicks	17, Southside Street.
PORTSEA	Griffin & Co.	2, The Hard.
QUEENSTOWN	T. Miller	1, Harbour Row.
SOUTHAMPTON	S. W. Wolff	76, High Street.
„	Southon & Franklin	90, High Street.
SUNDERLAND	T. Reed & Co.	184, High Street West.
SOUTH SHIELDS	T. L. Ainsley	Mill Dam.
SWANSEA	F. Martin	1 and 10, Somerset Place,

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Sub-Agents

(Abroad).

Amsterdam	L. J. Harri	Prins Hendrikkade, No. 90.
Berlin	D. Reimer	12, Anhalt Strasse.
Bremerhaven	W. Ludolph	72, Smidt Strasse.
Brisbane	Watson & Ferguson	Queen Street.
Cape Town	Juta & Co.	Booksellers.
Gibraltar	J. A. Rumbo	Mercantile Marine Service Association.
Hague, The	Van Cleef Brothers	Libraries.
Hamburg	Eckhardt & Messtorff	Steinhoft I.
„	Thos. Downie	9, Stubbenhuk.
„	Friederichsen & Co.	61, Neuer Wall.
Havre	V. & M. Lepetit	13, 15, Rue de Paris.
Hobart (Tasmania)	Walch & Sons	Merchants.
Hongkong	C. J. Gaupp & Co.	Booksellers.
Honolulu	Lieut. Jackson, R.N.	
Malta	Collector of Customs	Custom House.
Marseilles	A. Rabier	4, Quai Rive Neuve.
Melbourne	J. Donne & Son	59, Elizabeth Street.
Montreal	Wm. Foster, Brown & Co.	233, St. James Street.
„	Hearn & Harrison	1640–1642, Notre Dame Street.
Newcastle (N.S.W.)	R. C. Knaggs & Co.	46 and 48, Hunter Street.
New York	Eggerts & Sons	74, Wall Street.
„	John Bliss & Co.	128, Front Street.
Paris	Galignani Library	224, Rue di Rivoli.
„	Augustin Challamel	5, Rue Jacob.
Port Adelaide	A. E. Sawtell	Divette Street.
Port Natal	Lewis J. Wilson	
Quebec	Dawson & Co.	St. Peter Street.
Saint John (New Brunswick)	A. B. Smalley	91, Prince William Street.
Shanghai	Lane, Crawford, & Co.	Merchants.
Singapore	Hon. Secretary and Treasurer.	Sailors' Home.
Suez		
Sydney, N.S.W.	Turner & Henderson	16 and 18, Hunter Street.
Tokyo	Takata & Co.	Merchants.
Toronto	Charles Potter	31, King Street.
Valparaiso	Shringley & Westcott	Calle Cabo.
Vancouver Island	Hibben & Co.	66, Government Street, Victoria.
Vienna		
Wellington		

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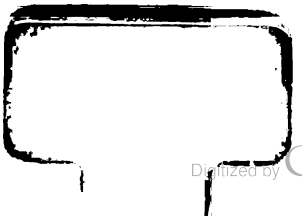
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